ELECTRICAL REVIEW

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30th July, 1948

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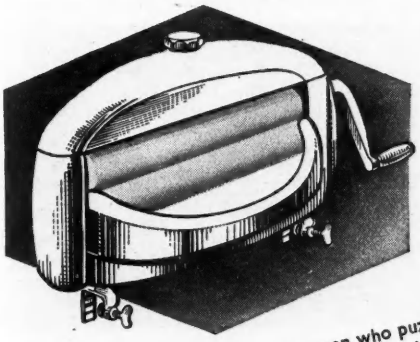
EDITORIAL, ADVERTISING & PUBLISHING OFFICES: Dorset House, Stamford St., London, S.E.1
Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (60 lines).
Annual Subscription, Post free: Great Britain and elsewhere £2 9s. 6d. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, and crossed "Lloyds Bank."
Entered as Second Class Matter at the New York, U.S.A., Post Office.



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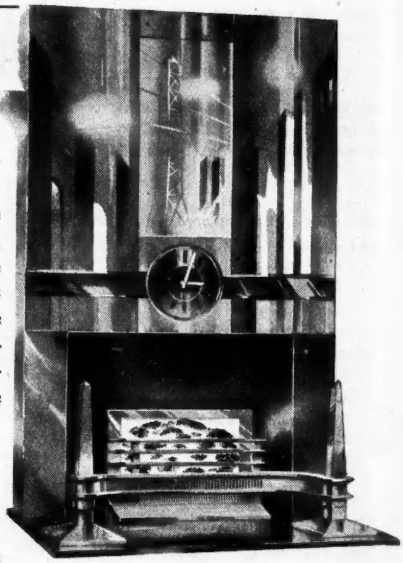

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXLIII. No. 3688 30th JULY, 1948 9d. WEEKLY

Recognition of Contractors

E.C.A. and National Register

IN our issue of the 9th July we made some comments upon the present uncertainty existing among electrical contractors in view of the possibility that the Electricity Boards might engage in installation work on a large scale.

Apart from this question of possible future competition there is another matter engaging the attention of the Electrical Contractors' Association, that of recognition by the British Electricity Authority and Electricity Boards. It involves the relationships (or absence of them) between the E.C.A. and the National Register of Electrical Installation Contractors. Until a year or two ago a large proportion of the registered contractors were also members of the E.C.A., but when the E.C.A. came to the conclusion that voluntary registration had not proved satisfactory and that nothing short of compulsory registration of contractors and their operatives would maintain a high standard of installation work, the Association asked its members to withdraw from the Register. E.C.A. members did so, leaving the Register very much weakened.

Similar Objects

The attitude of the E.C.A. is understandable and can be justified. It imposes as a condition of membership the maintenance of a high standard of work and this is backed by a guarantee-of-work scheme. The National Register also has a guarantee scheme and registered contractors are also required to carry out good work or be removed from the Register.

Thus the objects of the two organizations are practically identical, and E.C.A. members cannot see why they should pay two lots of fees. The difference between them, now that the two are distinct, is largely one of magnitude, but that is the crucial point. The E.C.A. will claim that its 3,000 members form the better part of the contracting industry and that any dealings with the industry should be conducted through the Association. What can the Register claim ? It cannot contend that at present it carries as much weight as the E.C.A., but it can say that the Registration Board is an independent, or at least representative, body and not a trade association. This would naturally incline the B.E.A. towards it.

The B.E.A.'s Attitude

The defection of E.C.A. members by no means killed the Register, however, because it still had the support of the Institution of Electrical Engineers, the E.C.A. of Scotland, the manufacturers and the Electrical Trades Union. Recognition by the B.E.A. now would be calculated to more than compensate for any damage done to it.

The B.E.A. should surely not be tempted to wield the big stick to settle domestic affairs within the industry, particularly in view of the intention so often implied that the B.E.A. would disturb the *status quo* in the industry as little as possible.

In any action which it may take the B.E.A. must not ignore the views of a substantial and stable section of the industry in settling its future relationships with contractors. For instance it would be inequitable to confine installation work to

registered contractors even if it were pointed out that all E.C.A. members were eligible for registration or re-registration. This, in fact, would look like a backdoor method of securing the compulsion which has already been rejected by the Government. Although the E.C.A. is in favour of compulsory registration it could hardly be expected to acquiesce in this way of achieving it. And what about the operatives who are the people who actually do the work ? The problem is one for earnest and amicable discussion between the parties concerned and not one for forcible solution.

Export Trends

THE steady progress made by electrical manufacturers in the export drive may be fairly assessed from the quarterly figures over the past year. Thus in the second quarter of 1947 the total value was £16·6 million, or an average monthly rate of £5·5 million. Since then, by unbroken increases, the total has been raised to £25·9 million in the second quarter of the current year, the monthly rate running at approximately £8·6 million. Very large exports of wires and cable have been primarily responsible for these good figures. Twice during the quarter cable manufacturers have topped the "target" for the end of the year. Electrical machinery exports revealed a contrary trend, but the reason for this is clearly not one of falling demand.

Fuel Efficiency

IN view of the useful results yielded by the "Fuel and the Future" Conference in October, 1946, the decision of the Ministry of Fuel and Power to hold another next year is welcome. Prominence in the programme will no doubt be given to surveys being undertaken by the Fuel Efficiency Committee of the Ministry. These include power consumption per unit of output and the use of low-grade fuels in industry. In the first case a high power consumption may be what is needed if it reduces man-hours. In the second, the best way of dealing with such fuels is to burn them in electric power stations.

Industrial Loads

LIMITATIONS of peaks on public supply systems are a tripartite affair. The Electricity Sub-Committee of the National Joint Advisory Committee has recommended that industrial establishments, like commercial premises (as previously reported by us), shall be required to reduce their maximum demands by 20 per cent during peak hours next winter. The criterion, however, will be 1946-47 to avoid penalizing those who have installed private plants before last winter. The Sub-Committee expresses the hope that an appropriate reduction will be secured from domestic consumers also. While it would be rash to dogmatize on next winter's probable demand in view of the unpredictable influence of the weather, the estimate of 1,000 MW of generating plant deficiency seems to us unduly optimistic.

Atomic Research

FOR the first time in two and a half years since the Atomic Energy Research Establishment was founded by the Ministry of Supply a limited number of representatives of the technical and general Press were last week invited to visit Harwell in Berkshire; those who finally attended were selected by ballot. There is much to be seen there of intense interest to engineers and scientists of all kinds as is indicated on another page in this issue—excepting those whose job of work is the production of electric power. For the latter the visit served mainly to emphasize the oft-repeated reminder that no serious person believes nuclear energy will make any contribution to world power during the next decade.

Production Organization

To complete the picture of the set-up it should clearly be understood that Harwell, which provided a nucleus of accommodation, is the research establishment. The production organization has its headquarters at Risley in Lancashire. Under its direction plant is nearing completion at Springfields, near Preston, for the refining of uranium from ores and concentrates and the manufacture of canned uranium rods. Also under Risley direction is the pile establishment in the Windscale works at Shellafield in Cumberland on which work started about a year ago. Finally there is the Radiochemical Centre at Amersham, Bucks, which will shortly undertake the packing and distribution of radioactive isotopes made in the Harwell piles for use in medical, biological, agricultural, marine and other kinds of research.

Making Tyre Tubes

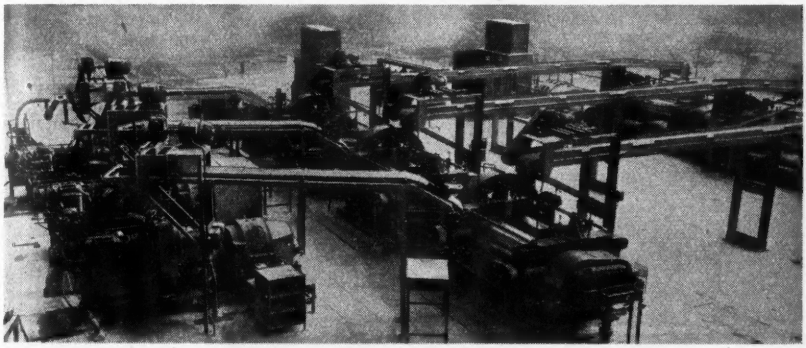
Flow-line Production at Speke

RUBBER mixing and tyre manufacture at the new Dunlop factory at Speke were described and illustrated in the *Electrical Review* of 11th July and 31st October, 1947, respectively, and we now propose to deal with the electrical applications in the continuous straight flow-line production of car and giant tubes.

At the beginning of the flow line are two lines of three 60-in. warming mills—disposed normally to the flow line. Actually there are three flow lines and each of the first three warming mills is the commencement of one of these. The three mills in the first line receive sheets of cold rubber compound from the mixing department and warm the compound up during a milling operation between the rollers. The warming is the result of the friction ratio between the two rolls which run at different speeds, and the heat so generated is controlled by circulating cooling water through the hollow rolls. The compound from the first line of warming mills is passed to the mills in the second line by overhead conveyors.

Each line of three warming mills is group driven by a 300-h.p., 375-r.p.m. G.E.C. synchronous induction motor from which transmission is first via a totally enclosed double-helical speed-reducing gear with a ratio of about seven to one. From this reducing gear is driven a line shaft from which there is a separate transmission to one roll of each mill, at one end, through pinion gear. At the other end the two rolls are engaged by pinion gear of suitable ratio to afford the different roll speeds.

So that the mills can be stopped in the shortest possible time, as a safety measure for the operatives, the motors are all arranged for dynamic braking. For this purpose each motor is separately excited, and a special totally enclosed weight-operated trip switch with a trigger latch release is operated by means of a trip wire to initiate the dynamic braking. The motor is brought to rest in this way within 3·5 revolutions of the rotor. The special characteristics of these motors include heavier overloads and a 0·9 leading power factor, with correction facilities. The main switchgear for the motors is of the air-break contactor type, and in each case it is enclosed in a steel cubicle, together with a separate starter and the braking resistances.



At the beginning of the flow line are two lines of 60-in. warming mills ; the second line (centre) serves extruders (left)

The overhead conveyors between the two lines of mills are driven by a 1-h.p. squirrel-cage motor mounted on the delivery end of the conveyor, with enclosed speed-reducing gear to the conveyor end drum. The ratio of the reducing gear is such as to afford a rubber strip feed speed which coincides with the speed of the front roll of the mill, from which roll the strip is taken, thus ensuring that the speed of the strip on the conveyor is compatible with the rate of production of the strip in the rolls.

In the nip of each warming mill in the second line is maintained a bank of rubber compound, while from each mill a strip of the compound is fed directly and continuously to a tube-extruding machine by means of another overhead conveyor. In contrast to the constant-speed conveyors between the two groups of mills, these conveyors are variable-speed equipments in consequence of the rate of feed being determined by the size of the tube to be produced. D.c. motors are therefore used for driving them—in each case a 1-h.p., 250-V compound-wound unit, with similar transmission to the end drum to that employed for the other conveyors.

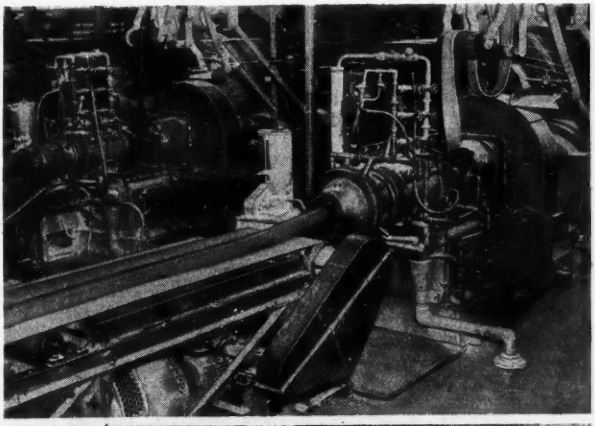
The feed control system has an arrangement whereby the strip is festooned immediately before it enters the extruder. Under a loop of the festoon is a levered tray on which the loop bears, or otherwise, according to the length of the loop, i.e., the rate of feed of the strip. If the loop is too large the tray is weighed down, and if the loop is too small the tray rises by virtue of its own balance. These movements result in the actuation of a mercury switch in the lever arm, and this, in turn, operates a relay, a contactor and the conveyor motor.

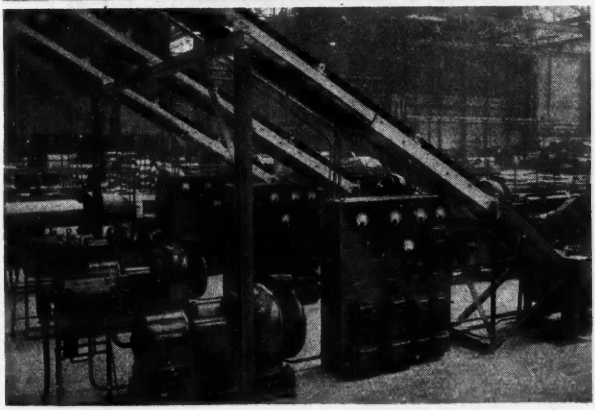
In each extruding machine the tube is formed over a die rather like the tube in a cable-sheathing machine, and the rubber compound is forced over the die by an internal worm feeder. Each extruder is driven by an E.C.C. compound-wound, variable-speed, dual-voltage motor which has speed ranges of 250 to 500 r.p.m. at 250 V and 500 to 1,000 r.p.m. at 500 V. The maximum powers developed are 50 and 100 h.p. at 250 and 500 V, respectively. Transmission is first through an enclosed reducing gear and then via a pinion train on to the worm shafts. The variation in speed at either voltage is obtained by shunt control. A hand-operated multiple-step starting panel controls the motor; it is rated for starting the motor against full-load torque, and is complete with a field regulator and other standard equipment.

All the conveyor-section motors are variable-speed Ward Leonard controlled units, and they have a common speed range; overhead conveyor drives top and water-tank conveyor drives below

From the extruders the tubes pass directly on to conveyor systems—one in each production line — several

hundred feet long, each of the three systems or lines being arranged in four sections. On the first conveyor section, which is fed immediately from the extruder, the tubes are automatically weighed and gauged. Then the tubes pass on to the second section which is submerged in water in a suitable tank for cooling purposes. The third air-cooling section is very long and runs well up overhead; it has an inclined subsection at each end for delivery to and from the main conveyor. On the final conveyor section, at bench height again, the tubes are printed and cut to prescribed lengths.





Above: Each extruder is driven by a dual-voltage, variable-speed motor (extreme right); note festoon control and conveyor drive under conveyor

Below: The four motors on each complete conveyor system are controlled from a common contactor panel adjacent to the W.L. set for the line

The first and last conveyor sections in each line are driven by 1-h.p. to 3-h.p. d.c. motors, while the water-tank and overhead cooling sections are driven by 2-h.p. to 6-h.p. d.c. motors. They are all variable-speed drives with a common speed range effected by Ward Leonard control. For this purpose the four motors in each conveyor line are all supplied by a 20-kW E.C.C. Ward Leonard m.g. set. This comprises a directly coupled pair of machines with a 32-h.p., 1,440-r.p.m. screen-protected s.c. motor controlled by a star-delta starter.

The four motors on each complete conveyor system are all controlled from a common contactor panel adjacent to the appropriate Ward Leonard m.g. set. Each panel is equipped with a main generator field regulator by which a master speed control is exercised over all the motors at the same time, but local (trimmer) field regulators near the motors afford individual speed control to each motor. This trimmer control is necessary to compensate for variations in the length of the tubes during the cooling process. Each separate motor has its own control push-button on the main panel, and the motors are started up individually.

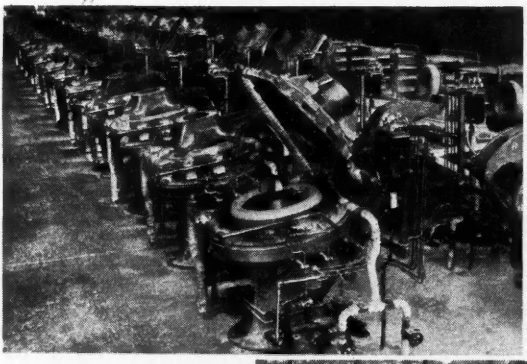
The speed range of each of the section motors in each conveyor line is 280 to 2,240 r.p.m. In each case transmission is first through a totally enclosed reducing gear and then via a short chain system on to the end drum of the conveyor. The motors and gear boxes of the first and last conveyor sections are floor mounted directly under the conveyor.

In the case of the water-tank sections the motors and gear units are actually mounted in the tank structure over the conveyor. In the case of the overhead conveyors each motor is cantilevered over the inclined sub-section of conveyor leading down to the final section.

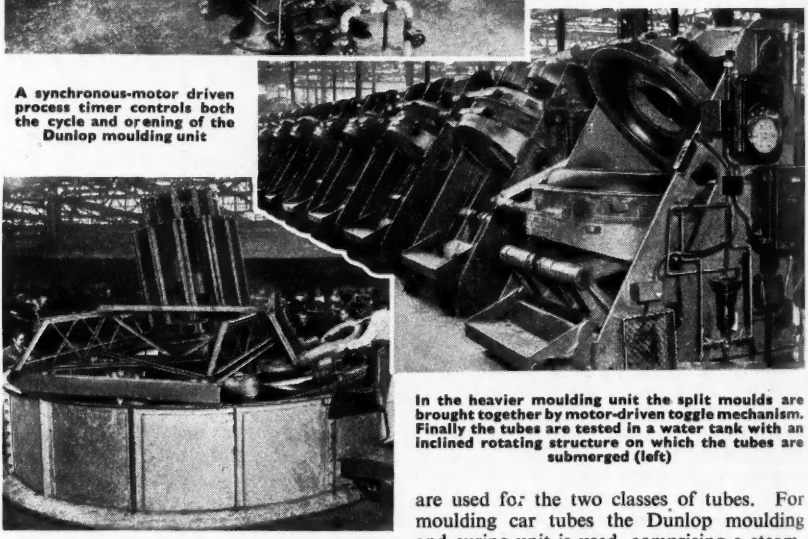
On each final conveyor section the tubes are cut by a knife along a horizontal revolving frame above the belt, the frame being driven by a friction disc which bears on the conveyor belt. The knife is fitted with a mica-wound element, the resulting hot blade thus ensuring clean cutting of the tubes. This element is supplied through a slip-ring assembly in view of the knife movement. To avoid sticking, french chalk is liberally applied to the tubes on the conveyor, and at the cutting-off tables the surplus chalk is reclaimed by an extraction system. This incorporates a motor-driven centrifugal fan and filters in a special housing, and trunks down to suction hoods over the conveyors.

As a safety measure during the starting up of the plant and for the general convenience of the operators during production there is telephonic communication between the extruder and the " cutting-off " ends of each conveyor line. After being cut to length the tubes are fitted with their air valves and the two ends of each tube are then joined together by a simple "nipping" operation.

The processes employed in the production of car and giant tubes are identical up to this stage in the flow line, and it is only in the subsequent moulding processes that different types of machines are used for the two classes of tubes. For moulding car tubes the Dunlop moulding and curing unit is used, comprising a steam-heated split mould which is opened automatically at the end of the pre-set time. This operation is effected pneumatically and a synchronous-motor-driven industrial process timer is used to control both the curing time and the automatic opening of the



A synchronous-motor driven process timer controls both the cycle and opening of the Dunlop moulding unit



In the heavier moulding unit the split moulds are brought together by motor-driven toggle mechanism. Finally the tubes are tested in a water tank with an inclined rotating structure on which the tubes are submerged (left)

press. The compressed air used for this operation is obtained from the works compressed-air service.

In the heavier moulding unit employed for the giant tubes the steam-heated split moulds are brought together by toggle mechanism which is driven by a 7½-h.p., 1,440-r.p.m. s.c. motor through a suitable speed-reducing unit. In this case the industrial process timer used for controlling the cycle actuates the contactor equipment associated with the main motor at the end of the cycle, thereby opening the press. The motor and toggle mechanism are in the base of the machine, i.e., under the mould. On closing the mould a magnetic brake operates on the driving-motor coupling, thus ensuring smooth closing of the mould. The magnetic brake is controlled by a limit switch which is operated after a predetermined travel of the moving portion of the mould.

Finally the tubes are tested for punctures in a water tank in which the inflated tubes are submerged. In the tank is a revolving structure which is slightly inclined from the horizontal, so that at one point arms which project up from the structure and carry the tubes are out of the water, while at the opposite point they are under water. The arms are in pairs and each pair accommodates a tube. The arms open out under the influence of a system of counterweights to the extent of limiting guide rails along the path of the arms. In this way the arms close in at the loading and take-off point and open out on the other side so as to grip and hold the tubes securely under the water.

Each pair of arms bears a reference number, and when the operator viewing the tubes where they are submerged observes a faulty tube (bubbles) a signal indicating the reference number of the arm bearing the faulty tube is given to the operator at the loading and take-off point of the test tank.

The rotating structure is driven by a 10-h.p. s.c. motor with star-delta control, and transmission is first through an enclosed speed-reducing unit and then via bevel gearing and a rack round the central portion of the structure which rises out of the water and houses the system of weights.

After testing, the tubes are deflated on deflating turrets. Each turret enables about twelve tubes to be connected to the works vacuum service and thereby deflated before packing for dispatch. A conveyor line runs alongside the turrets from the testing machine to the dispatch department.

We are indebted to the Dunlop Rubber Co., Ltd., for permission to visit the factory and publish this article, and to Mr. D. Crabbe, chief engineer, and his staff for their co-operation.

Shortages in Ulster

Effect on Electrical Development

AT the end of 1947 commitments of the Electricity Board for Northern Ireland involving l.v. and h.v. extensions dated back some eighteen months for which about 4,000 poles were required, states Mr. Lendrick McMaster, secretary, in the latest report of the Board. The total number of wood poles delivered during the year was 1,342 and, of an order for 1,500 concrete poles placed in May, 1946, only 608 were delivered. Steel for cross-arms, stay wire and insulator pins was also very scarce, and delivery periods for porcelain and glass insulators, transformers, switchgear and cables were exceedingly long. These difficulties coincided with a widespread desire to use electricity in the home, farm and factory. Because of the limited number of cookers available and the greatly increased capital and maintenance costs the Board ceased to offer them on hire.

During the year the Board's area of supply was considerably extended as a result of the confirmation of the revised No. 8 Development Scheme, and the undertakings of the Antrim companies, Antrim Town, Carrickfergus, Glenarm and Portstewart were acquired. Thus 19,839 consumers were added as well as 3,885 new consumers in the Board's original area, making the total 76,376. Sales aggregated 140·4 million kWh compared with 111·1 million in 1946 (the new undertakings were transferred in the latter half of the year, so that the full effect is not reflected in this increase). The average price received per kWh sold was 1·48d. against 1·42d. in the previous year.

At the Ballylumford station which the Board operated for the Ministry of Commerce a total of 237 million kWh was generated, the maximum load being 59,950 kW. Extensions in hand included the erection of a Parsons 31,500-kW turbo-alternator (No. 3) which is expected to be available next month, and two boilers. A further 31,500-kW set and two additional 150,000-lb.-per-hr. boilers are scheduled for 1950.

The Board's accounts show a revenue of £907,058 (against £700,133 in 1946), with working expenditure of £709,943 (£551,880). Allowing for interest and sinking fund charges, there was a net surplus of £568, to which is added a credit balance of £36,826 from 1946.

Views on the News

Reflections on Current Topics

THE three-fold loss to electrical engineering in the death of Donald Bright Hoseason at the early age of forty-nine years was finely expressed by Sir Arthur Fleming at the memorial service which was held at the King's Chapel of the Savoy. As an engineer his most notable achievements were in improved designs of electric motors, which established his international reputation. Latterly his main interest was in training and education, in which he would doubtless have gone far. Both aspects of his career were closely linked with a third attribute—a high character and an ability to work harmoniously with others, more particularly in advancing the interests of his profession, which made his election as vice-president of the Institution of Electrical Engineers so welcome to those who knew him.

* * *

Recalling their origin in token fashion, the Batti-Wallahs' Society last Saturday cruised down the Thames beyond Gravesend and up as far as Hammersmith Bridge. Under the direction of Col. H. J. Wellingham, the president, with Mr. J. W. Woolley as "mate," we embarked in M.V. *Viscountess* flying the Society's initial signal. The weather was better than it had threatened to be (despite which no one failed to turn up) and progressively improved throughout a most enjoyable day, which included in its programme a visit to the museum of the Royal Naval College, Greenwich, with its relics of Nelson. The trip showed, incidentally, how much electric power stations add to the character of London's river in many of its reaches.

* * *

Referring to my comments on the use of appropriate saucepans on hot-plates, Dame Caroline Haslett, director of the Electrical Association for Women, points out to me that, while the radiant plate can more efficiently use a light-weight saucepan than can a solid plate, the intense heat of the radiant plate soon causes buckling. Moreover, when milk or milk foods are cooked in very light-weight saucepans, they are apt to "catch" before reaching boiling point; this rarely happens with a heavy saucepan. Also it is a considerable disadvantage to have any saucepan which cannot be used both on the radiant plate and on the solid plate of the griller, as it is often an economy to transfer a pan from one type of plate to another during cooking operations.

* * *

It gave me pleasure to read in the July "Newsletter" of the Malden and Coombe Ratepayers' Association a "vote of thanks" to the neighbouring borough of Wimbledon for the electricity service it had efficiently provided over many years—all the more so because ratepayers' organizations generally have a reputation for being rather censorious. The writer recalls that during the war the supply was excellent, interruptions due to the "blitz" short, and in some recent cold "snaps" electricity had been supplied when large areas of England had been "cut." Not only that, he adds, but these same people had apparently subsidized the supply for many years, because within days of the undertaking being nationalized the price had been raised. The sting, I perceive, is in the tail !

* * *

One can sympathize with the editorial opinion expressed in the Quarterly Bulletin of the Electrical Officers' Association (R.A.F.) that the reconstitution of an electrical sub-branch would favourably influence the recruitment of the kind of man required for the Volunteer Reserve. The Bulletin itself provides evidence of the high technical attainments of the electrical engineers who are on the staffs of well-known manufacturers and hold commissions in the Royal Air Force. Thus the issue I have in front of me includes excellent articles on a new gyro-magnetic compass, electrical problems of starting aircraft gas turbines (including information on the turbine itself), the nature of dielectrics, and vibration. All of these indicate the highly specialized duties of an electrical kind that have to be carried out.

* * *

Sad news comes from Southend. The Corporation is offering for sale pre-war illumination equipment which it has in hand. This looks like the abandonment of all hope of brighter times. Perhaps the equipment will be purchased by a resort which has more optimistic views of the future.

—REFLECTOR.

Progress at Harwell

Laying the Foundations for Nuclear Power Research

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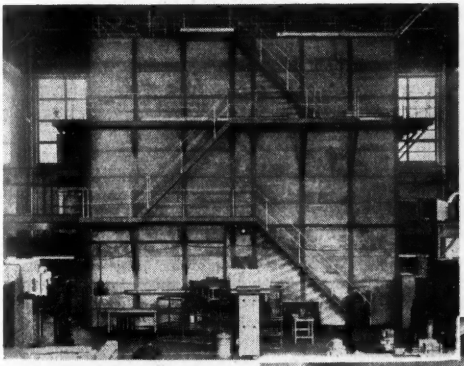
ALTHOUGH the activities of the Atomic Energy Research Establishment may at some future date exercise a profound influence on the course of electrical engineering, the progress shown last week on the occasion of the visit of Press representatives was primarily of interest to the architectural, civil engineering and medical professions.

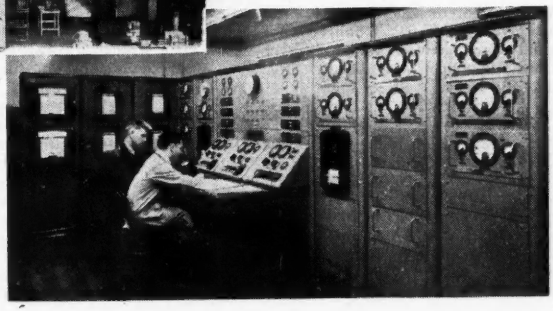
Fundamentally new ideas in building construction have been evolved to house the so-called "hot laboratories" where the chemical reactions of radioactive substances are to be studied. Work must be carried out in laboratory suites heavily screened with lead and concrete and ventilated on a lavish scale. Wiring, plumbing, ventilating ducts and all services must be accessible for maintenance from the outside, since the interior of the laboratories will normally be accessible only to scientific staff and then only after complete change of clothing on entering and leaving the several zones.

The disposal of radioactive by-products has been one of the major problems of those responsible for the design and layout of the Establishment. An effluent disposal farm on a scale normally appropriate to a large town is being built to handle the cooling water and ordinary domestic requirements of the Establishment and to deliver the processed water to storage tanks for chemical and radioactivity tests under the control of public health authorities before it is discharged into the River Thames at Sutton Courtenay.

Electrical precipitation is to be used for extracting radioactive dusts from the exhaust ventilation air.

Electronic control is used extensively in the operation of the two atomic piles known as "Gleep" (graphite low energy experimental pile) and "Bepo" (British experi-





General view of "Gleep," the 100-kW experimental pile at Harwell and (below) control panel and recorders for temperature, neutron density, etc.

mental pile) designed for maximum heat dissipation in the uranium rods of 100 kW and 6,000 kW respectively (*Electrical Review*, 9th July, 1948, p. 58).

Remote indication of neutron density inside the pile is by electronic counter circuits actuated by the ionization impulses generated in chambers containing boron trifluoride gas. The power level at which the pile operates is controlled by admitting or retracting cadmium rods, which absorb neutrons. These rods are suspended vertically and are attached to the control mechanism by magnetic clutches. In the event of a general failure of auxiliary power supply, the rods automatically fall into their channels in the pile and the reaction is shut down.

The smaller pile is already being used for the manufacture of radioactive tracer elements for use in medical, horticultural and metallurgical research and a separate Radiochemical Centre at Amersham is being formed for packing and distribution.

Heat generated as an incidental by-product of nuclear reactions in the larger pile ("Bepo") is to be used experimentally for space heating, but it is emphasized that the possibility of utilizing nuclear energy for power generation on an economic basis must rest on the results of the researches for which the Harwell establishment is being built. In the nuclear reactions which form the present basis of pile operation, only a small proportion of the uranium (the U235 isotope) is consumable. The first step will be to devise means of utilizing the U235 to breed secondary fuel from the more plentiful, but less useful, U238 or from thorium. It will then be necessary to investigate the metallurgical problems associated with the high temperatures generated inside the pile and to develop efficient and safe methods of extracting and disposing of the intensely radioactive end-products of nuclear reactions. The consensus of informed opinion appears to be that no appreciable contribution to world power resources can be expected from nuclear energy during the next decade.

Public Lighting Conference

A.P.L.E. Programme at Eastbourne

THE annual conference of the Association of Public Lighting Engineers is to be held this year at Eastbourne from Monday to Friday, 13th-17th September. The headquarters will be at the Grand Hotel. Proceedings will commence on the Monday afternoon at the Conference Hall, Winter Garden, with a meeting of the Council, followed by the annual general meeting; the official opening by the Mayor of Eastbourne (Councillor R. E. Richards); the induction of the president, Mr. N. Boydell, manager of the South-Eastern Sub-Area, South-Eastern Electricity Board; the opening of the exhibition of street lighting apparatus; and, in the evening, by a civic reception.

On the following morning Mr. Boydell will give his presidential address and afterwards Mr. J. S. Smyth (G.E.C. Research Laboratories) will give a paper on "Unidirectional Lighting of Dual Carriageways and Side Roads." The afternoon paper will be by Dr. S. English (Holophane) on "Street Lighting in the Vicinity of Aerodromes." "Basic Principles in the Design of a Street Lighting Installation and Their Practical Application" is the subject of the paper to be read by Mr. D. M. Thompson (Wigan) on the Wednesday morning. The conference luncheon (limited to 250) follows at the Grand Hotel. After the associates' meeting in the afternoon there will be an official inspection of the exhibition and, for the ladies, tea in the grounds of the Winter Garden.

"One Hundred Years of Research and Development in Electric Light" will be dealt with by Dr. J. N. Aldington (Siemens) on Thursday morning. The afternoon is left free for delegates to visit the exhibition, and the president's reception is in the evening. The final paper on Friday morning is on "Safety First on the Highways—With Special Reference to Street Lighting." It will be given by Mr. C. N. Melton (Dagenham). Afterwards there will be an open forum. A coach tour through Sussex has been arranged for the afternoon.

Domestic Electrical Science

A PLEASANT ceremony took place last Friday at the London School of Domestic Science, Basil Street, S.W., when Dame Caroline Haslett presented diplomas to a large number of successful students of the School. The audience consisted largely of parents of students.

Mr. S. C. Hurry, who is a director of the school, presided. Dame Caroline expressed herself as very optimistic regarding the scope for those properly trained in domestic science in the electrical industry, especially as demonstrators. She gave a personal pledge to concern herself with the improvement of their status and remuneration. Dame Caroline and other guests of the school remained to tea with the staff and students.

The school, of which Mrs. M. H. Bain is principal, can accommodate some sixty students with its present facilities.

Manufacture of Plastics

New Plant at Aycliffe

LAST week Mr. Harold Wilson, President of the Board of Trade, officially inaugurated the phenolic moulding material unit at the new works of Bakelite, Ltd., at Aycliffe, near Darlington. The completion of this plant marks the first stage of an extensive development project by the company in this area, involving an expenditure of over two million pounds.

The commissioning of this pilot plant brings into operation the first fully automatic moulding material unit ever built in this country or in the United States. It requires the minimum number of operatives and will make an appreciable difference to the output of bakelite moulding material and an effective contribution to the needs of the electrical industry.

The layout may be considered in three stages: raw materials, rolling and grinding. Powdered bakelite resin and wood flour comprise the chief raw materials. There are also critical additions of dyes, pigments, plasticizers, etc., which are collectively termed " master batch."

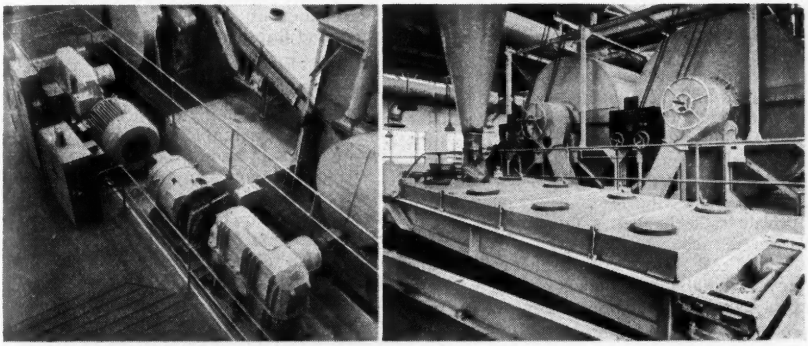
In order to facilitate testing at all stages of manufacture an elaborate pneumatic tube system has been installed for the dispatch of samples to the physical laboratories and the return of data to the operators. All the machine drives are electric, the supply being three-phase, four-wire at 400 V from the local undertaking. Control of the plant is fully automatic and is effected by electrical means.

The basic materials are fed into four primary hoppers and carried to the top of the building by totally enclosed conveyor systems. Each material then feeds through its own automatic weighing machine, the resin, master batch and recovered material passing into a common hopper on the floor below. Thence the mixture is carried to a disintegrator after which it is thoroughly mixed with wood flour. It is then lifted to the top of the building once more and enters a " continuous blender " comprising a large rotating drum where the initial thorough mixing takes place before storage.

The powder then passes through a complex system of hot rolls for thorough kneading and mastication, emerging as a steaming and somewhat rubber-like sheet. It cools rapidly to a brittle solid, after which it is crushed and ground.

The next process is sifting, the material which fails to pass being returned for further grinding. Finally it is mixed and blended in 5-ton batches to ensure uniform moulding qualities. From the blenders, the powder passes through an automatic weighing machine, then over magnetic separators to remove any ferrous matter and into drums ready for dispatch.

Other buildings on the site accommodate equipment for the manufacture of urea moulding materials and vinyl resins together with all their derivative products which will ultimately form a major part in the activities at Aycliffe.



Driving motors for the hot rolling mills and (right) automatic sifting mechanism with blending drums in the background

German Lamp Production

PRODUCTION of electric lamps in the Anglo-American zone of Germany which at the beginning of this year was expected to attain a monthly average of 5·5 to 6 million units, is unlikely to reach this figure now as a result of shortage of wolfram and molybdenum filament wire. Production in May decreased to 2·05 million lamps from 2·24 million—the target figure—in April and it is unlikely that this figure will be much increased upon in the course of this year.

E.R.P. in Practice

Marshall Aid and the Electrical Industry

By John C. Hancock

THE text of the Economic Co-operation Agreement (Stationery Office, Cmd. 7446) concluded between the United Kingdom and the United States of America, formally approved by Parliament and signed on 6th July last, deals in the main with broad principles. No indication is given concerning the commodities or equipment likely to be received under the European Recovery Programme; nor is it stated how such assistance is to be dispensed.

At first sight Marshall Aid appears to be another form of "lend-lease." Under that system, it will be recalled, the United States Government bought outright from private suppliers and manufacturers. After delivery was made to the Federal Supply Bureau the private concern had nothing to do with the actual shipment of the goods. As a contrast to lend-lease, E.R.P. legislation is based on the belief that the use and strengthening of private trade channels is an important part of economic recovery, not only for Europe but for the rest of the world. In other words, any material or equipment required by the private trader or industrialist, to be paid through E.C.A. funds, will go through normal trade channels. More likely than not the "person, agency or organization" acquiring equipment through E.R.P. will be quite unaware whether in fact it is being paid for by E.C.A. funds or not.

London Committee

How will a firm of manufacturing electrical engineers, for instance, be able to secure a particular machine-tool or item of equipment which they have long needed to re-equip or develop their factory, and for which, hitherto, they have been unable to get an import licence? The answer briefly is to try again: that is, to submit an application for an import licence in the usual way. They will not be called upon to decide whether their projected importation will be paid for through E.C.A. funds—that is a matter for the two Governments to decide. In practice this means the "London Committee" working in close liaison with the American E.R.P. Mission, now established in this country, under the direction of Mr. Thos. K. Finletter. The London Committee comprises representatives of the Treasury, the Board of Trade, the Ministry of Supply and other interests, and it will examine each application for an import licence involving a purchase from the United States. Assuming that a licence is duly granted the firm will then be able to go ahead and place an order with an American supplier for the desired equipment in the ordinary course of business. Meanwhile the London Committee, in collaboration with its opposite numbers on the E.R.P. Mission, will have decided whether the equipment could with advantage be purchased through E.C.A. funds.

Special Account

Apart from getting his import licence, the importer has no more than academic interest in whether his transaction is being financed through E.R.P. or not, because he will have to pay for his goods anyway—but in sterling. By a process of inter-governmental bookkeeping, namely by the establishment of a special account with the Bank of England, deposits in pounds sterling relative to the dollar values of goods received under grant aids will be made by the British Government in respect of each deal effected under the Economic Co-operation Agreement. Of such sterling amounts as are paid into this "Special Account," up to 5 per cent may be set aside and used by the American Government to cover administrative expenses in this country, and for the "stockpiling" of certain United Kingdom goods for strategic purposes.

Of one thing the electrical trader or manufacturer may be certain: that is, whatever goods or equipment he may receive, knowingly or unknowingly, through Marshall Aid, he will not be looking the proverbial gift horse in the mouth, for sooner or later it has to be paid for.

Searchlights

THE five papers with ensuing discussions, which constituted the symposium on searchlights held a year ago in London, have now been published as a special book, a limited edition, of 164 pages with 116 diagrams and illustrations on imitation art paper. An additional paper has been included on aircraft searchlights in anti-submarine warfare. The book is obtainable for 18s. 6d. post free from the Illuminating Engineering Society, 32, Victoria Street, London, S.W.1.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced by Sir George Nelson, chairman of the Marconi Companies, that **Sir Stanley Angwin,** K.B.E., D.S.O., M.C., T.D., chairman of Cable & Wireless, Ltd., has agreed to act as consultant and adviser on research and development to the board of Marconi's Wireless Telegraph Co., Ltd. The appointment of Sir Stanley Angwin as adviser will thus maintain the valuable link for the exchange of technical knowledge and experience between the operators of overseas telegraph services and the Marconi Company, with its research, development and manufacturing activities in connection with the provision of apparatus for carrying on such services.

The British Electricity Authority has selected eight representatives to serve on the B.E.A.-E.L.M.A. Joint Committee. They are **Mr. E. L. Gethin,** contracts engineer, and **Mr. F. S. Naylor,** assistant commercial manager, both of the Central Authority; **Mr. R. Lee,** sub-area liaison officer of the London Electricity Board; and five Area Board chief commercial officers, **Mr. N. F. Marsh** (East Midland), **Mr. J. F. Smith** (South Wales), **Mr. A. Haselhurst** (Yorkshire), **Mr. W. A. Royle** (North-Eastern) and **Mr. J. W. Moule** (South-East Scotland).

The Midlands Electricity Board announces the following appointments in the Central Gloucestershire sub-area:—Sub-area commercial officer, **Mr. S. Hartland,** M.B.E., A.M.I.E.E. (formerly consumers' engineer, West Gloucestershire, Power Co., Ltd.); district manager, Stroud, **Mr. A. Barnes,** A.M.I.E.E. (construction engineer West Gloucestershire Co.); district manager, Dean Forest, **Mr. J. Blackburn** (district engineer at Lydney, West Gloucestershire Co.); and district manager, Severn Vale, **Mr. W. C. Bowler,** M.I.E.E. (engineer and manager, Warmley Rural District Council).

With effect from 1st September next, **Mr. W. C. Hine** has been appointed station superintendent at the Little Barford generating station of the British Electricity Authority (Eastern Division) in succession to **Mr. F. A. Hayward** (divisional group generation engineer–operation). Mr. Hine was previously station superintendent at Lime House power station, Stepney. **Mr. R. R. Belbin** has been appointed station superintendent at the Bedford generating station in succession to **Mr. N. Fleming** who is retiring. Mr. Belbin was previously chief assistant engineer at Brimsdown.

Mr. J. Barke, M.INST.M.E., a senior executive in the Mining Department of Oldham & Son, Ltd., has retired on pension after twenty-four years' service with the company, and on 13th July presentations were made to him by Mr. John Oldham, O.B.E. (chairman and joint managing director) on behalf of the board and Mr. H. Holt, jun. (general technical manager) on behalf of the executive directors and senior staff. Mr. Barke played an important part in the improvement of portable lighting equipment for mines and was closely associated with the promotion of regular candle-power tests and scheduling of lamp performance.

Mr. S. J. C. Wells, who has recently been appointed manager of George Ellison S.A. (Pty.), Ltd., has been connected with the Ellison organization for nearly twenty years. Born in South Africa, Mr. Wells was educated there and in England, and served an apprenticeship with the B.T.H. Co. He joined George Ellison, Ltd., in 1926, and was transferred to Johannesburg in 1931. During the last war he served with the Director of War Supplies, South Africa, as production engineer for electrical machinery. From 1944 to 1948 he was manager of the Contract Department of the First Electric Corporation of South Africa, Ltd.

Mr. S. J. C. Wells

Mr. L. E. J. Fairbairn, chief engineer of the Installation Department of the Jointless Firebrick Co., Ltd., has resigned on account of ill-health. **Mr. D. W. Williams,** assistant engineer, has taken charge of this department.

Mr. E. C. Lynch, B.SC., A.M.I.E.E., A.M.I.MECH.E., who has been station superintendent at Portsmouth generating station since July, 1946, sailed for South Africa last week on the maiden voyage of the *Pretoria Castle*. Mr. Lynch has been appointed to the position of assistant city electrical engineer at Salisbury, Southern Rhodesia. He was a pupil at Portsmouth Grammar School and Municipal College, and obtained his honours degree of B.Sc. (Eng.) in 1934, serving his college apprenticeship in electrical engineering with Metropolitan-Vickers in Manchester. He returned to Portsmouth as a student with the Portsmouth electricity undertaking in 1936, being appointed junior shift engineer in 1938 and subsequently senior shift engineer. In 1945 he took up the duties of boiler house superintendent at the Ironbridge generating station, Wolverhampton, returning to Portsmouth in the following year as station superintendent.

Mr. D. R. Crow, A.M.I.E.E., has recently been appointed sales manager of the Fluorescent Department of the Benjamin Electric, Ltd.

Mr. S. Fildes has been appointed manager of the Newcastle-on-Tyne branch of Musgrave & Co., Ltd., in succession to **Mr. W. J. Adams.**

Mr. Ernest Chester, lecturer at the Oldham Technical College, has been appointed lecturer in electrical engineering at the Sheerness Technical Institute.

Miss Irene Margaret Preece, only daughter of Mr. G. G. L. Preece, M.I.E.E., who recently retired from the position of general sales manager to Bruce Peebles & Co., Ltd., was married on 24th July to **Mr. J. K. Edwards** at the Church of St. John the Evangelist, Princes Street, Edinburgh.

Mr. S. McCracken, who was given as an A.M.I.E.E. in our last issue, is now, we learn, a full member of the Institution.

An "At Home" was held by **Mr. A. R. Cooper,** divisional controller, Merseyside and North Wales Division, B.E.A., and his staff at the headquarters in Clarke's Gardens, Woolton, Liverpool, on 24th July. About 500 visitors attended from all parts of the division. An arts and crafts exhibition attracted 204 entries. A marionette show was given by Mr. S. J. Martin, junior charge engineer, Wallasey, and the British Council assisted by providing cinema films. Dancing concluded the evening.

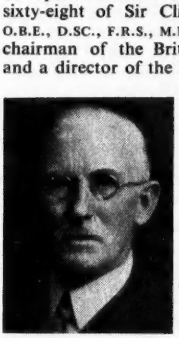
The Council of the Electrical Wholesalers Federation, with a few of its past presidents, entertained **Mr. R. W. Smith** at the Waldorf Hotel, London, on 22nd July to a farewell luncheon on his retirement from the electrical industry. The only two guests who were not members were old friends of Mr. Smith, namely Mr. J. W. Townley and Mr. Guy Campbell. During the luncheon Mr. Smith was presented with an inscribed silver loving cup as a token of appreciation of the work he has done for the wholesalers' cause and as a memento of the inauguration of the Electrical Wholesalers Federation in 1914 and his occupation of the presidential chair for the first four years of its existence.

The annual outing organized by the **Ekco Social and Sports Club** was held on 17th July when a large gathering went to Brighton by coach. Among the party were Mr. R. R. Laird, chairman of the Club, Mr. F. Allen, general works manager, Radio Division, E. K. Cole, Ltd., and Mr. J. R. Hunt, general works manager of Ekco-Ensign Electric. Ltd.

The annual staff outing of **Frank Westerman (Wholesale), Ltd.,** took place on 18th July, when a party of seventy, including a few guests, spent a day at Severnside, near Tewkesbury. Sports were held in the morning, the cup for the inter-departmental relay race being won by the office staff, and a cricket match was played in the afternoon. Following the evening meal at the Swan Hotel, Tewkesbury, there was a dance and concert in the hotel ballroom. Among the guests were Mr. and Mrs. W. Parker (Monmore Conduits, Ltd.), Mr. and Mrs. Gee (General Accessories Co., Ltd.) and Mr. Buckley (Armorduct Cable Co., Ltd.).

Obituary

Sir Clifford Paterson.—We deeply regret to report the death on Monday at the age of sixty-eight of Sir Clifford Copland Paterson, O.B.E., D.SC., F.R.S., M.INST.C.E., M.I.E.E., F.INST.P., chairman of the British Standards Institution and a director of the General Electric Co., Ltd.



The late Sir Clifford Paterson

Educated at Mill Hill School, Sir Clifford received his technical training at Finsbury Technical College and Faraday House. From 1901 to 1919 he was at the National Physical Laboratory where he was responsible for the photometric and electrotechnical departments. Joining the General Electric Co. in 1919 to establish and direct the Research Laboratories at Wembley, he built up an organization which during the war was engaged largely on radar development, and now has a staff of 1,750.

Sir Clifford was a past-president of the Institution of Electrical Engineers, the Institute of Physics, the Illuminating Engineering Society and other bodies. He served as a member of the Executive Committee of the National Physical Laboratory and as vice-president of the Royal Institution and Royal Society of Arts. He was chairman or member of various Government Departmental Committees on technical subjects. His greatest personal contributions to science were in the field of lighting and vision and he gave the first demonstration in this country of the hot-cathode mercury-vapour lamp to the Illuminating Engineering Society at Wembley. He was Faraday lecturer of the Institution of Electrical Engineers, Guthrie lecturer of the Physical Society and Huxley lecturer of Birmingham University. He received the D.Sc. (Honoris Causa) from Birmingham University in 1937 and was awarded the James Alfred Ewing Medal of the Institution of Civil Engineers in 1946. He was appointed to the board of the G.E.C. in 1941 and was knighted in 1946.

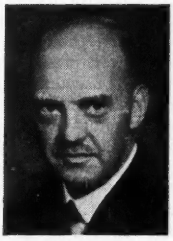
Recently Sir Clifford paid a visit to Australia and New Zealand and his last honour was the award by the Illuminating Engineering Society (America) of its Gold Medal, which was presented to Lady Paterson on 22nd July. He was taken ill while returning to this country and died in Watford Peace Memorial Hospital. The burial service is to-day (Friday) at Watford Congregational Church and a memorial service will be held in London as soon as possible.

Mr. J. H. Shaw.—The death occurred on 24th July at the age of sixty-seven, in West Middlesex Hospital, of Mr. John Henry Shaw, M.I.E.E., who was from 1912 to 1919 deputy city electrical engineer of Bradford. On leaving Bradford he opened a London office on behalf of the Davenport Engineering Co., Ltd., Hick, Hargreaves & Co., Ltd., and J. Shaw, Son & Greenhalgh, Ltd., and he continued at that office for many years. Ill-health had forced him to give up business for some years past.

Mr. H. Webber.—The death occurred on 23rd July of Mr. Harry Webber, M.I.E.E., M.I.MECH.E., M.I.T., of Addingham, near Ilkley, at the age of sixty-nine. Mr. Webber was engineer and manager of Keighley Corporation Electricity Department from 1910 to 1943, when he retired, and he had also been manager of the former Keighley tramways.

Mr. M. Black.—The death occurred on 17th July of Mr. Michael Black, J.P., managing director of Michael Black, Ltd., Glasgow. Mr. Black was the founder of the company in 1919 and during his long association with the trade he had served on many committees and taken a very active part in all trade interests.

Mr. R. R. Martindale.—We learn with regret of the death on 22nd July at his home at Beckenham of Mr. Robert Ruthven Martindale, M.I.E.E., M.I.MECH.E., deputy chief engineer (generation) to the British Electricity Authority. Previously he had held the position of chief executive officer of the London Power Co. since the death of Sir Leonard Pearce in 1947. Recently he was appointed a member of the Industrial Coal Consumers' Council set up under the Coal Industry Nationalization Act. He was educated at Rutherford and Armstrong Colleges and after training with J. H. Homes and at the Wallsend Slipway he joined the Tynemouth Electricity Department. Later he served with the Cleveland & Durham Power Co., and at the Deptford station of the London Electric Supply Corporation, Ltd. In 1932 he became chief assistant to the station superintendent at the new Battersea station of the London Power Co. which embodied many features novel at that time, and the successful and efficient operation of the station was in no small measure due to his efforts. In 1938 he was appointed personal assistant to Sir Leonard Pearce and deputy chief engineer of the company, subsequently becoming chief generation engineer and executive assistant to Sir Leonard. The cremation on Monday at the Streatham Park Crematorium was attended by a large number of colleagues and friends. Lord Citrine, chairman of the B.E.A., was represented by Mr. J. Hacking, deputy chairman.



The late Mr. R. R. Martindale

Wills.—**Sir William Murray Morrison,** late vice-chairman, British Aluminium Co. Ltd., left £75,200 gross (£59,411 net).

Mr. F. Wallers, a director of Mather & Platt, Ltd., left £12,685 gross (£11,039 net).

Mr. B. S. H. Warde, manager of the Brighton branch of Cryselco, Ltd., left £1,859 gross (£1,738 net).

Mr. Percival Marshall, chief of Percival Marshall & Co., Ltd., and the Electrical Press, Ltd., and founder and editor of the *Model Engineer*, left £8,100 gross (£7,968 net).

Mr. E. Todd, late district manager, Cornwall Electric Power Co., left £3,760 gross (£3,586 net).

Mr. E. J. Fouracre, a director and general sales manager of the Westinghouse Brake & Signal Co., Ltd., left £10,053 gross (£5,840 net).

Mr. R. Dimmack, late deputy borough electrical engineer of Newport, left £1,719 gross (£1,662 net).

Mr. H. G. Watson, electrical engineer, Oxford, left £15,135 gross (£14,448 net).

British Standards Institution

Annual General Meeting

SPEAKING as president of the British Standards Institution at its annual meeting in London last week, Lord McGowan referred to the growing awareness of industries not only of the need for standards, but also of the advantages to themselves in co-operating with the Institution in the preparation of standards on a national scale.

He stressed the importance of British Standards to the export trades and added that one of the best ways to ensure that overseas national standards did not conflict with our own was for the local representatives of British firms to participate directly in their preparation. Many firms which were not formerly interested in export markets were now taking advantage of the help the Institution could give them, which included full information about the national standards of the importing countries. In conclusion, Lord McGowan urged everyone concerned with the guidance of industry to participate in the work of the Institution and to support it financially.

Sir William J. Larke, in presenting the annual report as vice-president and acting chairman of the Institution, outlined the progress being made in every department and referred specifically to the extension in the circulation of British Standards throughout the world, and to the fact that many industries were having British Standards translated into foreign languages.

Mr. Roger Duncalfe, chairman of the Finance Committee, in presenting the annual accounts, emphasized the need for industry to finance adequately this important work.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Engineers' Organizations

I AGREE with your correspondent "H. H." as to the undesirability of adding to the already numerous engineers' organizations. It is apparent, however, that the existing chartered institutions cannot concern themselves with the matters to which he refers. In these circumstances an independent organization for the protection of the status of the qualified engineer, and of the public from unqualified practitioners, is clearly necessary.

If anyone should doubt this, let him examine the nationalized electricity supply industry where he will find that there are many instances of highly qualified engineers who have held important and responsible positions in the industry and who are now relegated to minor and insignificant posts subordinate to unqualified persons with little or no engineering training or experience. The case of the writer, who has many years' experience as engineer and manager of an electricity supply undertaking, is a typical example. M.I.E.E.

Steam Turbine Cycle

REGARDING the controversy between Mr. Hallowell and Mr. Field, the cheapest fuel oil is about twice the price of coal on a heating basis in this country, so any plant restricted to oil has a very limited applicability.

In the absence of an economizer there are severe limitations on recuperation of terminal heat with coal firing. These arise from the flue gas quantity being increased by air leakage into the setting, and by considerations of tolerable temperature in the mill or at the grate.

No unit coal firing system has yet been held to be capable of dealing with 1,000 deg F air, but there is a need for such a development. Without it Mr. Field's cycle seems to be restricted to oil.

A plant cycle must be considered as a whole because of the reactions of one part on another. Thus the sacrifices that Mr. Field's cycle would have to make in the recuperation of heat if it burnt coal would offset much of its gain in other directions, and would probably leave it no better off than an orthodox reheating cycle using say 1,050 deg F and 1,000 deg F reheat. These temperatures are regarded as already proven in the gas-turbine field and are being adopted in the United States for some coal-fired steam plants; they may be regarded as the next step in this country.

Arguments based on theoretical considerations may be quantitatively quite incorrect when applied to practical cases, e.g., the known gains with increased initial temperature and with reheat in practical cycles are both substantially more than shown by the Rankine cycle or the Rankine cycle with bleed. Conversely, the diagram gain in the closed-circuit gas turbine by the use of a superposed cycle of equal pressure ratio with reheat is nil. The two portions of the cycle are identical and have the same efficiency. The actual gain lies in doubling the output for a given weight of air and for a given surface of reheater.

The use of a gas producer in front of a gas turbine has been considered before, but the capital cost of this has so far been a stumbling-block, another being the unsuitability of present producers for operating under high pressure. The Lurgi type might alter the situation, though it should be realized that for low capital cost the gas turbine would have to use uncleaned gas (which it has not yet succeeded in doing), and, moreover, this would not result in any recovery of by-products. If the gas turbine is to consume cleaned gas, and by-products are to be recovered, then we have a gas-works in front of a gas turbine, implying high capital cost and reduced efficiency.

Twickenham. B. WOOD.

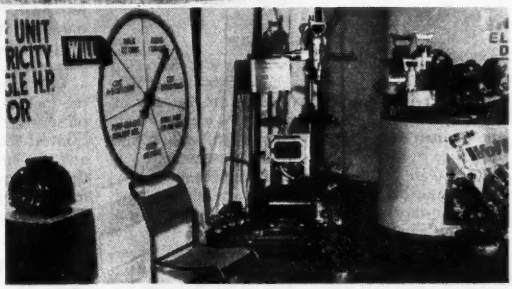
Napier Shaw Premium

THE Institution of Heating and Ventilating Engineers is making awards of the Napier Shaw Premium for 1948 and 1949. Mr. T. Bedford, D.SC., PH.D., has consented to prepare the first Premium paper, which it is hoped will be presented at the Institution meeting to be held in April next. The award for 1949 will be in open competition and will not be restricted to members of the Institution. Copies of the regulations can be obtained from the secretary of the Institution, 75, Eaton Place, London, S.W.1.

Electricity in Agriculture

Eastern Electricity Board's Displays at Norwich and Watford

ATTENDANCE at this year's Royal Norfolk Show was less than 2,000 short of the record figure of 51,000 last year, when glorious weather coincided with the visit of the King and Queen. Largest of all the 195 stands on the showground was that organized by the Eastern Electricity Board, situated on high ground and with its 30-ft clock tower giving exact time to the many thousands of visitors all over the spacious grounds of Keswick Park, near Norwich.



The stand of the Eastern Electricity Board at the recent Hertfordshire Show and (right) a section of its display at the Royal Norfolk Show

The increasing demand for electricity in agriculture and commerce was emphasized by the number of trade stands making use of electricity this year. The official caterers used electric cookers and washboilers; agricultural engineers demonstrated electric welders; a 130-ft bore-hole with electric power-head supplied thousands of gallons of water for cattle and horses and stands all over the showground; an electrically driven grain dryer was demonstrated, and in all forty-seven standholders used electricity to drive machinery catering for various displays.

A special 11-kV cable had been laid from the village of Keswick, half a mile away, and the maximum demand on the supply was in the order of 120 kW. The Electricity Stand Committee set out to provide interest not only to farmers and agricultural engineers, but to their wives and families. The proximity of Norwich and nearby seaside resorts was taken into consideration and in three large marquees the latest domestic appliances, commercial catering equipment and agricultural and horticultural plant were displayed; lighting, which formed part of the displays, made use of special fluorescent fittings and reflectors. Much interest was shown in the display and demonstration of electrical equipment needed to conform to the Food and Drugs Act (Ice Cream Heat Treatment, etc.), 1947. All equipment on the electricity stand was connected for demonstration purposes. The fact that 240 inquiries were received and orders taken for appliances and plant to the value of just over £4,000, is some indication of the interest taken.

In addition to the display of the Eastern Electricity Board at the Royal Norfolk Show we reproduce a photograph of the Board's stand at the Hertfordshire Show held at Cassiobury Park, Watford, which was described in our issue of 16th July.

Standard Frequencies

THE radiation of standard frequency transmissions is of great value for the calibration of industrial and scientific sub-standards as well as work on radio-wave propagation and for survey purposes. Those emitted by station WWV in the United States are unfortunately subject to interference, so arrangements have been made for a limited standard service on three frequencies to be operated by the General Post Office in Britain with the object of demonstrating the feasibility of U.K. and European coverage.

Meanwhile a substantial increase of power is contemplated for the experimental transmission from station GMT on 2 Mc/s set up by the Royal Observatory at Abinger, Surrey, to facilitate comparison between quartz clocks used in the operation of the Greenwich time service.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Major Tufton Beamish asked the Minister of Fuel and Power if he would give an assurance that there would be no increase in the price of coal, electricity or gas to the consumer as a result of the increased contributions paid by employers under the National Insurance Scheme.

Mr. Gaitskell said that no assurance could be given that this increase in cost, though small in proportion to total cost of production, could be met in every case either in private or socialized industries without an increase in price.

Mr. Marples asked how prices of electricity on Merseyside at 1st July, 1948, compared with prices on 1st July, 1947. Mr. Gaitskell replied that information about changes in the average cost of electricity to the consumer between these dates was not available. He understood that some increases in a number of tariffs had been made by the Area Board and announced locally.

Hams Hall Ash Dumps

Sir John Mellor asked whether the Minister was aware of the nuisance caused by boiler ash blown over adjacent parishes from dumps at Hams Hall power station and if he would direct the British Electricity Authority to abate this nuisance by wetting the dumps or otherwise.

Mr. Gaitskell said he had not received any representations in this matter, which was one of day-to-day operation of the generating station at Hams Hall. He was, however, informed by the Authority that certain representations were made to them by the Meriden Rural District Council and that steps were at once taken to remove the grounds of complaint.

Lampholder Prices

Major Legge-Bourke asked the President of the Board of Trade if he was aware that one make of push-bar electric lampholders was being sold at 2s. 4d. by private traders and at 9s. by the Eastern Electricity Board, and what steps he was taking to ensure that these and other articles were sold by nationalized undertakings at prices fair to consumers.

Mr. Belcher said he was not aware of this, but he was looking into the matter. With regard to the second part of the question, no particular steps were necessary since price control orders did not discriminate between sales by nationalized undertakings and by other traders.

Wire Rod Allocations

Replying to Mr. Granville Sharp, the Minister of Supply, Mr. George Strauss, said that the independent wire drawers themselves decided that the allocations of wire rods should be calculated on their consumption of wire rods in 1939, the war years and 1945, and he was not aware that allocations had been increased to some users and decreased to others. The independent wire drawers depended to a substantial extent on foreign rods before the war. Since the war foreign supplies had been available in very small quantities and it was not practicable to make up the deficit by depriving the integrated works. With the increase in total steel production and the improvement in foreign supplies, arrangements were being made to supply the independent wire drawers within the next three months with the same share of all available rods as they had before the war.

Gas Bill Amendments

While accepting over 100 Lords' amendments to the Gas Bill, the House of Commons rejected ten amendments, the principal ones relating to the change of the basis of compensation for stockholders to reasonably maintainable income multiplied by an agreed number of years' purchase, and the restoration of the original basis of Stock Exchange values; the deletion of provisions for the alternative methods of compensation to stockholders; the inclusion of a worker representative on each Area Board; the inclusion of at least three full-time members on each Area Board; the investment of the Central Guarantee Fund in trustee securities; and the imposition on the Area Boards of the duty to continue to take part in any machinery for the promotion of industrial co-operation that was now part of any co-partnership scheme.

A.S.E.E. Competitions

MEMBERS of the Association of Supervising Electrical Engineers are invited to submit papers for the twentieth annual competition for the W. E. Highfield Shield. In addition to the Shield there will be cash prizes varying from £5 5s. to £2 2s. The winner of the Shield will have his name engraved on it and as part of his prize will receive a specially mounted and inscribed replica. The Shield is awarded for the best educational paper not exceeding 2,000 words, dealing with the electrical industry or the Association. Since the main object of the competition is to encourage papers of a practical nature and original thought, the literary style is of secondary importance.

The Association of Supervising Electrical Engineers announces the second annual competition for the Thurston Award, a silver trophy and a cash prize of £10, for the invention judged to be the most valuable contribution to the advancement of the utilization of electricity, or the improvement of distribution or installation technique. The competition is limited to the membership of the Association. The closing date for entries for both competitions is 31st March, 1949.

Incorrect Metering Connections

Calculating Registration Correction Factors

By A. Salzmann, A.M.I.E.E.

METERS should be connected according to an agreed convention. Current coils are inserted in the red and blue phases, while the potential coils are energized by red-to-yellow and blue-to-yellow voltages. If this convention is impracticable, any connection may be chosen, provided errors of connections are excluded and the energy and reactive meter register $\sqrt{3}$ E I cos ϕ and $\sqrt{3}$ E I sin ϕ.

For single-phase induction meters the driving torque is given by $T = K f \phi_E \phi_I \sin(\theta - \phi)$ ..... (1) where K = constant, f = frequency, ϕ_E = voltage coil flux, ϕ_I = current coil flux, θ = phase displacement between the fluxes at unity power factor ($\phi = 0$), assuming the phase displacement between current and current-coil flux to be negligibly small, and ϕ = power-factor angle. Since f is a constant, ϕ_E is proportional to the voltage and ϕ_I is proportional to the current, equation (1) can be written in the form $T = K_1 E I \sin(\theta - \phi)$ ..... (2) For $\theta = 90$ deg and lagging p.f. we obtain $T = K_1 E I \sin(90 - \phi) = K_2 E I \cos\phi$ .. (3) For $\theta = 0$ and 180 deg lagging and leading p.f. one gets $T = K_1 E I \sin(0 \mp \phi) = \mp K_2 E I \sin\phi$ ..... (4) and $T = K_1 E I \sin(180 \mp \phi) = \pm K_2 E I \sin\phi$ ..... (5)

It follows that for flux phase displacement $\theta = 90$ deg, the meter registers true power. For $\theta = 180$ deg lagging p.f. and $\theta = 0$ deg leading p.f., the energy meter is converted to a reactive meter and will register in forward direction since the torque is positive. (See equations (4) and (5)). For $\theta = 180$ deg leading p.f. and $\theta = 0$ lagging p.f., the reactive meter will register in a backwards direction. By reversing the polarity either of the current or voltage coils " T " becomes positive and the meter will record the wattless energy in a forward direction.

For three-phase two-element energy meters (Fig. 1) in which $\theta = 90$ deg the driving torque on each element disc is given by $T_r = K'_1 f \phi_{12} \phi_1 \sin(60 - \phi) = K_1 E_{12} I_1 \cos(30 + \phi) = K_2 \cos(30 + \phi)$ ..... (6) $T_b = K'_1 f \phi_{32} \phi_3 \sin(120 - \phi) = K_1 E_{32} I_3 \cos(30 - \phi) = K_2 \cos(30 - \phi)$ ..... (7) (Fig. 1.) Hence the total torque " T " is the sum of (6) and (7) and $= T_r + T_b = K_2 \sqrt{3} \cos\phi$ ..... (8) assuming standard phase rotation.

For any current and voltage combination differing from the standard connection we obtain similar values. Thus, if the current transformers are inserted in the red and yellow phases, we have to find which of the voltages should be associated with $+ I_1$ and $+ I_2$ to obtain $K_2 \sqrt{3} \cos\phi$. By combining E_{12} with $+ I_1$ and E_{32} with $+ I_2$ we get $T = T_r + T_y = K_2 [\cos(30 - \phi) + \cos(30 + \phi)] = K_2 \sqrt{3} \cos\phi$.

Three-phase energy meters can be converted to reactive meters with 180 deg flux displacement (standard phase rotation) if the voltages for the potential coils are supplied from a quadrature transformer comprising two

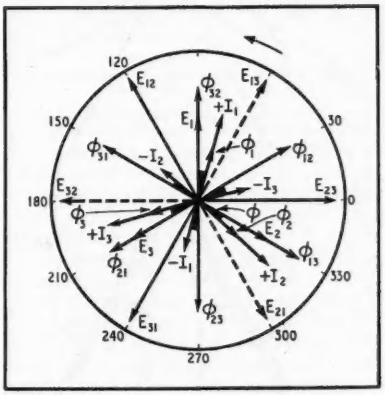


Fig. 1.—Energy meter. Current-voltage-flux relation with 90 deg flux displacement

auto-transformers connected in open delta, each having two tappings (Fig. 2). The voltages E_{12} and E_{32} must be shifted by 90 deg in clockwise direction applying to the red voltage coil E_{ae} instead of E_{12} and to the blue voltage coil E_{dc} instead of E_{32}.

To obtain the voltage $E_{ae} = E_{12}$ and $E_{dc} = E_{32}$ (N.B., E_{dc} and not E_{cd}) equal in magnitude, the windings $\overline{2I}$ and $\overline{23}$ are extended to $\overline{Id} = \overline{3e} = 15{\cdot}5$ per cent and $\overline{2f}$ and $\overline{2g}$ are increased by the same amount so that " a " and " c " are 57·7 per cent taps. Thus we obtain, since $E_{12} = E_{32} = E$,

$E_{ae} = E_{dc} = 1{\cdot}155\ E \sin 60 \text{ deg} = E$, $E_{ae} = E_{12}$ and $E_{dc} = E_{32}$.

Due to this quadrature shift the phase displacement between voltage and voltage coil flux is $\theta = 180$ deg and the driving torque on each element disc is given by $T_r = K^1_1 f \phi_{ae} \phi_1 \sin (150 - \phi) = K_1 E_{ae} I_1 \sin (30 + \phi) = K_2 \sin (30 + \phi)$ and $T_b = K_1{}^1 f \phi_{dc} \phi_3 \sin (210 - \phi) = - K_1 E_{dc} I_3 \sin (30 - \phi) = - K_2 \sin (30 - \phi)$. Since $I_1 = I_3$; $E_{ae} = E_{dc}$ the total torque is $T = T_r + T_b = K_2 \sqrt{3} \sin \phi$.

With reversed phase rotation the meter registers $(- K_2 \sqrt{3} \sin \phi)$ and will rotate in reversed direction for lagging p.f. and in forward direction for leading p.f. This follows from Fig. 2(a). For any current and voltage combination the expression $T = K_2 \sqrt{3} \sin \phi$ can be derived from the vector diagram. Take, for example, the condition when the c.t.'s are inserted in the red and yellow phases. By interchanging the leads to terminals 2 and 3 of the quadrature transformer (Fig. 2(c)), terminal 3 is connected to the yellow phase and terminal 2 to the blue phase, the quadrature-voltage vectors

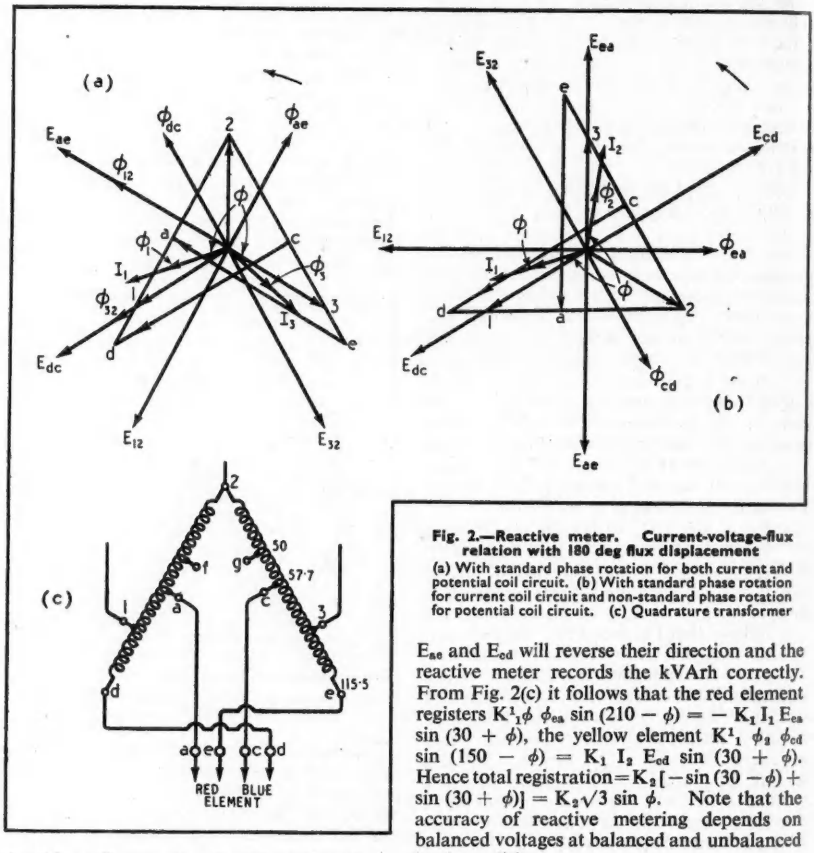


Fig. 2.—Reactive meter. Current-voltage-flux relation with 180 deg flux displacement

(a) With standard phase rotation for both current and potential coil circuit. (b) With standard phase rotation for current coil circuit and non-standard phase rotation for potential coil circuit. (c) Quadrature transformer

E_{ae} and E_{cd} will reverse their direction and the reactive meter records the kVArh correctly. From Fig. 2(c) it follows that the red element registers $K^1_1 \phi\ \phi_{ea} \sin (210 - \phi) = - K_1 I_1 E_{ea} \sin (30 + \phi)$, the yellow element $K^1_1\ \phi_2\ \phi_{cd} \sin (150 - \phi) = K_1\ I_2\ E_{cd} \sin (30 + \phi)$. Hence total registration $= K_2 [- \sin (30 - \phi) + \sin (30 + \phi)] = K_2 \sqrt{3} \sin \phi$. Note that the accuracy of reactive metering depends on balanced voltages at balanced and unbalanced load conditions.

An alternative method is to remove the auto-transformer, insert a reactor in line "2" and connect the red element voltage coil across $\overline{32}$ and the blue element coil across the lines $\overline{21}$. The reactor is identical in resistance and reactance with the meter coils; thus an artificial star point is produced

by external reactance and two meter coils.

Fig. 3 illustrates the quadrature shift. In the red element we combine I_1 and the phase voltage E_{30} lagging the line-to-line voltage E_{12} by 90 deg; in the blue element we associate I_3 and the phase voltage E_{01} lagging the line-to-line voltage E_{32} by 90 deg.

Due to this quadrature shift the phase displacement between voltages and voltage coil flux is 180 deg.

The driving torque is $T = K\ [\phi_1\ \phi_{30} \sin (150 - \phi) + \phi_3\ \phi_{01} \sin (210 - \phi)]$ or $T = K_1\ [I_1\ E_{30} \sin (30 + \phi) - I_3\ E_{01} \sin (30 - \phi)]$.

Since $E_{30} = E_{10} = E_{12}/\sqrt{3} = E_{32}/\sqrt{3} = E/\sqrt{3}$ we obtain $T = K_1/\sqrt{3}$. $\sqrt{3}\ E\ I \sin \phi = K_1\ E\ I \sin \phi$.

The gear train will, of course, have to be adjusted so that the meter will register $\sqrt{3}\ E\ I \sin \phi$ and not $E\ I \sin \phi$.

By placing resistances in parallel with the current coils and in series with the voltage coils, the phase displacement between the fluxes is adjusted to zero at unity p.f. (Fig. 4). The reactive meter is connected like an energy meter and metering is independent of the phase rotation.

For 60 deg flux displacement, the voltage-coil flux lags by 60 deg behind the voltage applied to each element (Fig. 4). This is effected by placing a short-circuited coil in each element series circuit and a small amount of resistance in each voltage-coil circuit.

To obtain correct registration we associate the red current with the yellow-to-blue voltage and the blue current with the red-to-blue voltage.

The torque is expressed by $T = K^1_1 f [\phi_1 \phi^1_{23} \sin (150 - \phi) + \phi_3\ \phi^1_{12} \sin (210 - \phi)] = K_1 [(+ I_1)\ E_{23} \sin (30 + \phi) - (+ I_3)\ E_{12} \sin (30 - \phi)] = K_2 \sqrt{3} \sin \phi$.

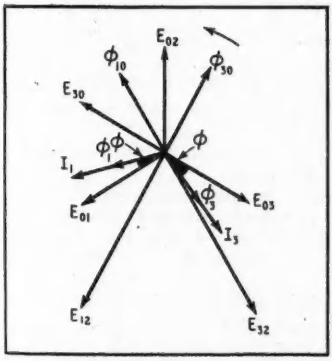


Fig. 3.—Reactive meter with reactor in circuits. Current-voltage-flux relation with 180 deg flux displacement

Checking Meter Connections

There are numerous possible errors in connections, for example, reversed polarity of instrument transformers, break in the secondary wires, incorrect earthed potential transformers, reversed polarity of meter coils, interchanging of voltage leads, reversing the phase rotation for reactive meters, interchanging of two c.t. leads so that the current transformers are connected either in series or in opposition.

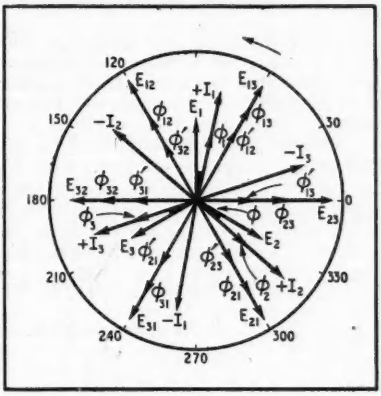


Fig. 4.—Reactive meter. Current-voltage-flux relation with zero and 60 deg flux displacement

Before proceeding with the test, compare the connections with the manufacturer's diagram and check the phase rotation. The secondary cables should be identified by continuity test unless they are marked and coloured. We must ascertain, when checking energy meters, for instance, that the element carrying red-phase current is energized by red-to-yellow voltage and the element carrying blue-phase current is energized by blue-to-yellow voltage. In addition, if there is a doubt about the terminal marking of the instrument transformers, the polarity of c.t.'s and p.t.'s should be checked.

Supplementary Check. Energy Meters

Interchange the red and blue voltage leads; a standstill at any lagging load p.f. will prove the correctness of the connection. The red element registers $[- K_1\ (+ I_1)\ E_{32} \cos (90 + \phi)] = - K_2 \sin \phi$ and the

blue element $[K_1 (+ I_3) E_{12} \cos (90 - \phi)] = K_2 \sin \phi$ (Fig. 1). Hence total registration $= - K_2 \sin \phi + K_2 \sin \phi = 0$.

It follows if the red element is temporarily non-operative, e.g., the voltage lead is disconnected and the blue element is energized by red-to-yellow voltage, the disc will always rotate in forward direction at lagging p.f., since the torque is proportional to cos $(90 - \phi)$.

Alternatively if the blue element is temporarily inactive and the red element energized by blue-to-yellow voltage the disc will rotate in reversed direction at lagging p.f. since the torque is proportional to cos $(90 + \phi)$.

A further check can be obtained by disconnecting the common voltage lead—in this case the yellow voltage lead. Drop in speed of the disc to half of the previous value at any load p.f. proves the correctness of the connection. The red element registers $\left[\frac{1}{2} K_1 (+ I_1) E_{13} \cos (30 - \phi)\right]$, the blue element $\left[\frac{1}{2} (+ I_1) E_{13} \cos (30 + \phi)\right]$; hence total registration $\left[K_2 \frac{1}{2} \sqrt{3} \cos \phi\right]$.

Reactive Meters. 180 deg Flux Displacement

Interchange lead d with lead a and c with e (Fig. 2(b)); the red current is associated with the voltage E_{dc} and the blue current with E_{ae}. A standstill at any load p.f. will prove the correctness of the connections. Red element registers $[K^1_1 \phi_1 \phi_{dc} \sin (90 - \phi)] = K_1 I_1 E_{dc} \cos \phi$ and the blue element registers $[K^1_1 \phi_3 \phi_{ae} \sin 270 - \phi] = - K_1 I_3 E_{ae} \cos \phi$. Hence total registration is zero.

It follows that if the red element is temporarily non-operative by disconnection of the voltage leads d and c, the blue element being energized by voltage E_{ae}, the disc will always rotate in reverse direction at lagging p.f.

Alternatively if the blue element is temporarily inactive and the red element energized by E_{dc}, the disc will rotate in forward direction at lagging p.f.

A further conclusive check can be made by reversing the phase rotation. Backward rotation of the disc with the same speed as at standard phase rotation will prove the correctness of the connection.

Fig. 2(a) shows that the torque for capacitive load and standard phase rotation is equal to the torque for inductive load at reversed phase rotation.

The red element registers $K_1 \phi_1 \phi_{ao} \sin (150 + \phi)$ and the blue element $K^1_1 \phi_2 \phi_{dc} \sin (210 + \phi) = - K_1 I_3 E_{dc} \sin (30 + \phi)$. Hence total registration $K_2 [\sin (30 - \phi) - \sin (30 + \phi)] = - K_2 \sqrt{3} \sin \phi$.

Reactive meters with 0 deg and 60 deg flux displacement can be checked in a similar manner.

Registration Correction Factor

The type of error of connections and the average p.f. being known, and the load being nearly balanced, the correction factor can be expressed by $C_e = M_{ea}/M_{el}$ and $C_r = M_{ra}/M_{rl}$, where C_e = correction factor for energy meter, M_{ea} = accurate energy metering, M_{el} = inaccurate energy metering, C_r = correction factor for reactive meter, M_{ra} = accurate reactive metering and M_{rl} = inaccurate reactive metering.

As an example, it is required to determine the correction factor for:

(*a*) an energy meter connected to current and potential transformers, the red current being associated with yellow-to-blue voltage in the red element and the blue current with red-to-yellow voltage in the blue element, afid

(*b*) a reactive meter having its blue current coil connected in reverse and the voltage leads to the red and blue elements interchanged. The flux displacement is 60 deg. It is assumed that the system voltages and inductive load are balanced.

On the energy meter, from Fig. 1, the red element registers $K_1 I_1 E_{23} \cos (90 - \phi) = K_1 I_1 E_{23} \sin \phi$, and the blue element $K_1 I_3 E_{12} \cos (90 - \phi) = K_1 I_3 E_{12} \sin \phi$. Correction factor, $C_{el} = \frac{M_{ea}}{M_{el}} = \frac{K_2 \sqrt{3} \cos \phi}{K_2 (\sin \phi + \sin \phi)} = \frac{\sqrt{3}}{2} \cot \phi$. At balanced load and cos = 0·756 lagging, the meter will record the energy correctly since $C_e = 1$. Probably this type of error of connections might long exist unnoticed.

On the reactive meter, from Fig. 4, the red element registers $K^1_1 \phi_1 \phi^1_{13} \sin (90 - \phi) = K_1 I_1 E_{13} \cos \phi$ and the blue element $K^1_1 (- \phi_3) \phi^1_{23} \sin (90 - \phi) = K_1 I_3 E_{23} \cos \phi$. Correction factor, $C_r = \frac{M_{ra}}{M_{rl}} = \frac{K_2 \sqrt{3} \sin \phi}{K_2 (\cos \phi + \cos \phi)} = \frac{\sqrt{3}}{2} \tan \phi$. At balanced load and cos ϕ = 0·756 lagging, $C_r = \frac{\sqrt{3}}{2} 0{\cdot}84 = 0{\cdot}725$.

COMMERCE and INDUSTRY

Industrial Load Spreading. Anglo-American Joint Committee.

IN the *Electrical Review* of 2nd and 16th July particulars were given of the steps to be taken to limit the demand from commercial (non-industrial) establishments next winter. Proposals in regard to industrial load have now been issued by the Electricity Sub-Committee of the Joint Consultative Committee (Stationery Office, 4d.). It is concluded that the net increase in generating capacity this year (400 to 500 MW) will not be enough to avoid load spreading from 1st December to 28th February on a national scale and in October, November and March by varying regional arrangements. Plant deficiency next January is expected to reach 1,000 MW on the basis of average weather conditions during the past five years. The Report recommends that industry should limit its demand in the mid-winter months to 80 per cent of the maximum for 1946-47 during the peak periods of 8 a.m. to noon and 4 to 5.30 p.m. Statutory powers should again be available to secure compliance with schemes to be prepared by the Regional Boards for the six winter months.

Higher Electricity Output

During the week ended 16th July 724·1 million kWh was sent out for public supply from solid fuel fired stations (representing 96 per cent of the total electricity sent out for public supply by the British Electricity Authority and the North of Scotland Hydro-Electric Board). This was 7·8 million kWh more than in the previous week and 133·6 million kWh more than in the corresponding week last year.

Polish Imports from Britain

The Polish Government has agreed to issue import licences for the United Kingdom during 1948 to a total value of £1,750,000, of which licences to the value of £260,000 were issued during the first half of this year, leaving £1,490,000 for the second half. The agreement falls within the scope of the three-year £35,000,000 trade understanding. It does not increase the 1948 trade exchange figure agreed in the spring, but extends the range of goods to be exchanged. Major items include £100,000 for radio sets and radio equipment. Among other goods, licences for which will be issued during the second half of 1948, are commercial refrigerators (£50,000), portable power tools (£20,000) and air compressors (£20,000).—*Reuter.*

Mechanical Handling Exhibition

Results justifying the repetition of the exhibition and convention another year were reported at the First National Mechanical Handling Exhibition and Convention which closed at Olympia, London, on 21st July. Attendances, consisting almost entirely of visitors professionally or commercially interested in mechanical handling problems, amounted to 4,000 a day, and convention sessions were attended by up to 550. The organizers, Associated Iliffe Press, who promoted the exhibition on a non-profit-making basis, are expected to announce the date of a second exhibition after they have received replies to a questionnaire from all exhibitors. There have been many requests already for space.

Apprentice Exchange Scheme

An apprentice training scheme organized by the Harland Engineering Co., Ltd., of Alloa, has now been in successful operation for some years and has provided a steady flow of new personnel for foundries, machine and fitting shops. Recently arrangements have been concluded with Laurence Scott & Electromotors, Ltd., of Norwich, to exchange apprentices so that in a three months' stay they would have an opportunity of experiencing design, planning and production methods in other engineering works of a similar character to Harland's. Five apprentices left Alloa on 20th June and on the same day five apprentices travelled there from Laurence Scott's works.

Examinations in Sales Management

In May, over 500 students in the United Kingdom sat for the qualifying and final examination in sales management conducted by The Incorporated Sales Managers' Association. A second examination is to be held from 2nd-4th December. Full particulars may be obtained from the Secretary, 23, Bedford Square, London, W.C.1.

Coal Consumers' Councils

The first Annual Reports of the Industrial Coal Consumers' Council and the Domestic Coal Consumers' Council have now been published. Referring to the need for improvement in quality and in suitability for different purposes, the first Report points out that the use of untreated small coal at the right price may be advisable rather than to clean all coal. Greater mechanization increases the amount of coal that should be cleaned, and the provision of cleaning plants is much in arrears. The better qualities of coal are required for export. Pending the introduction of a new price structure, the Councils welcome the interim arrangements for correcting the over-pricing of low-grade fuels due to the flat-rate increases imposed during the war. The Councils attach importance to restoring consumers' freedom of choice of coal.

Presiding at a Press conference on the Reports, Mr. Alfred Robens, M.P., Parliamentary

Secretary, Ministry of Fuel and Power, urged that trade organizations and the public generally should use the Consumers' Councils to put forward constructive suggestions for improvements in the service to consumers.

Promoting Industrial Efficiency

After talks in Paris on Monday the Chancellor of the Exchequer, Sir Stafford Cripps, announced that it had been decided to set up an Anglo-American joint committee, consisting of representatives of employers and trade unions, to promote industrial efficiency. The talks were with Mr. Hoffman, head of the Economic Co-operation Administration, and were attended by Mr. Harriman, the special representative in Europe, and Mr. Finletter, representative of the E.C.A. in London. The suggestion that the United States should co-operate with European countries in examining European methods of production and helping them to increase their efficiency was made by Mr. Hoffman at a Press conference in Washington. The Chancellor took the matter up with the National Production Advisory Council for Industry, proposing the formation of an Anglo-American joint committee. The United Kingdom is thus the first country to adopt Mr. Hoffman's suggestion.

Eastern District Joint Council

The latest issue of the "Eastern Electricity Bulletin" announces the composition of the Eastern District Joint Council (Administrative and Clerical Grades). The Council consists of ten representatives of the Board and Division (nine of whom have been appointed) and ten employee representatives, one from the Clerical and Administrative Workers' Union, seven from the National Association of Local Government Officers, one from the National Union of General and Municipal Workers, and one from the Transport and General Workers' Union. The first meeting of the Council was held on Monday last, and the Bulletin states that the formation of the Council marks a new departure in staff relations in the electricity supply industry.

"Aslib" Conference

The annual conference of the Association of Special Libraries and Information Bureaux will be held at Ashorne Hill, near Leamington Spa, on 18th and 19th September next.

Caroline Haslett Trust

The second annual report of the Caroline Haslett Trust covers the year 1947. Seven scholarship awards were made for 1947-48 and five scholarships and one grant were renewed for another year. Miss Joan Whitgift, holder of the first travelling exhibition (tenable in the United States) made a tour of E.A.W. Branches, lecturing on "American Homes and Home Economics." She also read her paper on "Some Aspects of Domestic Electrification in the U.S.A." to an interested audience at the I.E.E. on 23rd October. The Committee awarded its second travelling exhibition (tenable in Sweden) to Mrs. E. A. Windsor, of Hackney electricity undertaking. The Committee hopes that before long it may be possible to make a nation-wide offer of scholarships and thus to increase the value of the Trust.

New X-ray Company

Newton Victor, Ltd., has been formed to amalgamate the activities of the Victor X-Ray Corporation, Ltd., Newton & Wright, Ltd., and the X-ray research and manufacturing interests of the Metropolitan-Vickers Electrical Co., Ltd., under the ægis of the Associated Electrical Industries, Ltd. The head offices of the new company are at 15, Cavendish Place, London, W.1.

Television in Australia

The Australian Cabinet is to invite tenders for the installation of television transmitters in each of Australia's six State capitals. The first transmission will be made experimentally by the Australian Broadcasting Commission. Tenders are also to be invited for supplying 500 television receivers. The total initial cost of the scheme is estimated at £400,000.

New Conveyor System for C.T.O.

An order has recently been placed for the manufacture and erection of a new conveyor system in the reconstructed Central Telegraph Office near St. Paul's. This will replace an earlier installation which was destroyed by enemy action. The conveyor belt employed in this installation will be over 13,000 ft long.

Electro-Medical Apparatus for Switzerland

A report on the market in Switzerland for electro-medical apparatus has been prepared by the Counsellor (Commercial) to the British Embassy at Berne. Copies, together with further information, are obtainable from the Export Promotion Department, Room 1092, Thames House North, Millbank, London, S.W.1. (Ref. E.P.D. 43900/116/18/47.)

Stator for Dunston

C. A. Parsons & Co., Ltd., Heaton, Newcastle-on-Tyne, have delivered to the Dunston power station a 103-ton stator which will form part of a large extension scheme.

Diesel Plant for India

The United Kingdom Trade Commissioner in Calcutta reports that an inquiry has been received from the Chief Engineer (Electricity), Government of Orissa, Puri, for the supply of two diesel driven 200-kW generating sets, complete with switch boards and auxiliaries. The plant will probably be required for the new

capital at Bhubaneswar; delivery should be within a year of the date of placing the order. Interested manufacturers should correspond direct with the Chief Engineer (Electricity).

New Jarrow Factory Opened

The electrical components factory on the Bede Estate, Jarrow, erected for Morganite Resistors, Ltd., was officially opened recently by Mr. Harold Wilson, President of the Board of Trade.

Electric Mobile Canteens

One of the latest developments in the mobile canteen service provided by the Port of London Authority is the purchase by the P.L.A. of four

Morrison " Electricar " mobile canteen

20-cwt Morrison-Electricars to supplement their fleet of eight petrol vehicles. The " Electricars," which were made by Austin Crompton Parkinson Electric Vehicles, Ltd., are fitted with shelves for trays, and are air-conditioned.

Window Competition

E. K. Cole, Ltd., are about to launch a window dressing competition for radio dealers. Prizes totalling £250 are being offered. Displays are to feature the " Princess Portable " set and dealers are asked to submit photographs of their windows which will be judged by a panel presided over by Mr. E. K. Cole and including the editors of *The Wireless & Electrical Trader* and *Electrical and Radio Trading* and Mr. Wells Coates, the designer of the set. Details will be circulated to dealers shortly.

New E.A.W. Branch

The inaugural meeting of the Oldham branch of the E.A.W. in the Electricity Showrooms was addressed by Miss N. Kenyon, a member of the North Western Electricity Board. The chairman of the Board is Mrs. Binns, wife of the North Western Board's manager for the Oldham sub-area, and the secretary is Mrs. J. Taylor, formerly Miss C. Dewhurst, secretary of the Preston E.A.W. branch.

New Collier Launched

S. P. Austin & Sons, Ltd., Sunderland, have launched the collier *Pompey Light*, the second of two ships ordered by Portsmouth Corporation, before electricity was nationalized, for the purpose of carrying coal for the electricity undertaking.

Omission to Make Census Return

Lawson Beck, Ltd., were fined £5 with £10 costs at Gateshead for failing to furnish estimates, returns and information as requested to the Census of Production office of the Board of Trade. For the defence it was stated that the omission had not been done deliberately. The Board of Trade census inquiry comprised twenty-six pages.

Dissolutions of Partnership

J. A. Lawrence and **E. O. Wood**, carrying on business as radio and electrical engineers at 179, West Road, Westcliff-on-Sea, under the style of Lawrence & Wood, have dissolved partnership by mutual consent.

F. W. Latham and **A. Barnes** (" Fylde Armature Winding Co."), Back Ashburton Road, Blackpool, have dissolved partnership.

Annual Holidays

The works and offices of Walsall Conduits, Ltd., West Bromwich, will be closed for the summer holidays from 30th July to 9th August.

Zirconium Hydride

A product which has hitherto only been obtainable from the United States, zirconium hydride, is now available from Murex, Ltd., Rainham, Essex. It is in powder form and contains approximately 98 per cent Zr, the balance being mainly hydrogen.

Trade Announcements

The purchasing office organization of **Reynolds Light Alloys, Ltd.**, is being transferred from 9th August from the company's head office at Tyseley, Birmingham, to its works at Studley Road, Redditch, Worcs.

Julius Sax & Co., Ltd., have removed their offices and works to 24, Commerce Road, Brentford, Middlesex.

Large Fluorescent Lighting Installation

A fluorescent street lighting installation which is claimed to be the largest in London has recently been completed by the General Electric Co., Ltd. It comprises seventeen units, each with two lanterns, and extends along nearly

half a mile of Marylebone Road. The "Four-Eighty" lantern used is an improved model of those installed in Kingsway, and each houses four 5-ft 80-W "Osram" warm-white fluorescent lamps. Each pair of lanterns is mounted on a specially designed column head, the whole being mounted at 25 ft on existing steel columns in the centre of the carriageway. Spacing is approximately 150 ft. The scheme was carried out under the direction of Mr. F. Selley, manager Marylebone Section, London Electricity Board.

Channel Tunnel Project

A reasoned motion urging the Government to collaborate with the French Government in a fresh examination of the project for a channel tunnel has been tabled in both Houses of Parliament by the Channel Tunnel Study Group.

Trade Publications

Plessey Co., Ltd., Ilford, Essex.—Illustrated brochure fully describing the "Breeze" plug and socket system of pre-formed circuit wiring.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—Leaflet on starter switchboards for grouped electric drives.

Buck & Hickman, Ltd., 2, Whitechapel Road, London, E.1.—Bound sectional catalogue (437 pages with index), illustrated and priced, of power transmission and electrical accessories, switchgear, lighting and heating equipment, fans and household appliances, concluding with useful data and metric conversion tables.

Musgrave & Co., Ltd., St. Ann's Works, Belfast, Northern Ireland.—Technical folder describing an aerodynamic dust collector.

J. G. Statter & Co., Ltd., 82, Victoria Street, Westminster, London, S.W.1.—Leaflet No. 430 on a 60-A all-insulated service fuse carrier.

Babcock & Wilcox, Ltd., Babcock House, Farringdon Street, London, E.C.4.—Technical brochure describing ash and dust handling equipment.

Plessey Co., Ltd., Ilford, Essex.—Folder illustrating a wide range of dial drives for radio receivers.

Wild-Barfield Electric Furnaces, Ltd., Elecfurn Works, Watford By-Pass, Watford, Herts.—Technical brochure on equipment for carburizing town gas.

Electro Methods, Ltd., 112, Brent Street, London, N.W.4.—Illustrated leaflet on the Butcher-Black & Decker earth protection scheme for hand tools.

The Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.—Technical folder on special-purpose valves for industrial applications.

Metalclad, Ltd., Gasworks Road, Neath, Glamorgan.—Leaflet illustrating 30 and 36 in. electrically driven high-speed bandsaws.

C.W.C. Equipment, Ltd., 66, Victoria Street, London, S.W.1.—Priced catalogue of commercial fluorescent lighting fittings.

Berkeley & Young, Ltd., Tyseley, Birmingham, 11.—Five leaflets on 10 in. to 36 in. exhaust, 24 in. to 42 in. ceiling and 12 in. desk fans.

The Acru Tool Manufacturing Co., Ltd., 123, Hyde Road, Ardwick, Manchester, 12.—Priced leaflet on small panel mounting neon indicator lamp assemblies.

Marconi's Wireless Telegraph Co., Ltd., Marconi House, Chelmsford.—Three brochures giving technical data on the A.C.P.T.8 750 W radiation cooled H.F. pentode, description of a V.H.F. direction finder and the story of Marconi equipment in broadcasting.

Trade Marks

AMONG recent applications for the registration of trade marks are the following, objections against which may be made within a month from 21st July:—

ANCALITE. No. 660,718, Class 6. Wire of common metal (not insulated or fuse wire).—British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.

RADYNE (design). No. 660,191, Class 9. Electrical apparatus and instruments, and parts included in Class 9. Also No. 660,192, Class11. Heating apparatus and parts included in Class 11.—Static Condenser Co., Ltd., trading also as "Radio Heaters," Toutley Works, Toutley Road, Wokingham, Berks.

RHOMETER. No. 660,202, Class 9. Electrically operated measuring instruments.—Geophysical Prospecting Co., Ltd., Gayfere House, Great Peter Street, Westminster, London, S.W.1.

TOMPION. No. 661,457, Class 9. Electrical apparatus and instruments included in Class 9.—F. H. Thompson, 55, Derrydown Road, Perry Barr, Birmingham.

TELEVOX. No. 659,257, Class 10. Hearing aids for deaf persons.—Amplivox, Ltd., 2, Bentinck Street, Manchester Square, London, W.1.

ESKIMO (design). No. 661,302, Class 11. Refrigerating installations and apparatus.—Jackstone Froster, Ltd., 1, Hutton Road, Grimsby, Lincs.

INFORMATION DEPARTMENT

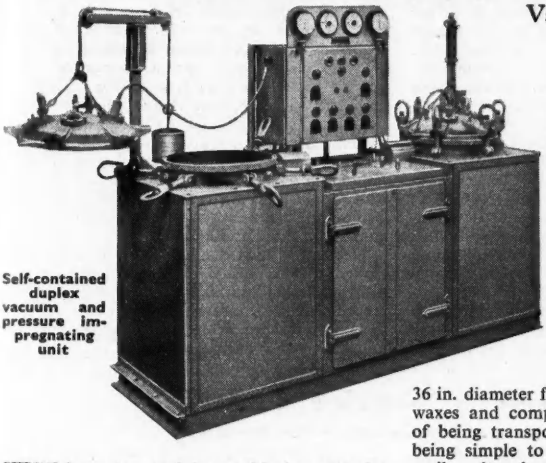
THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"P. & R." porcelain fuse bridges.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Impregnating Plant

Vacuum and Pressure System

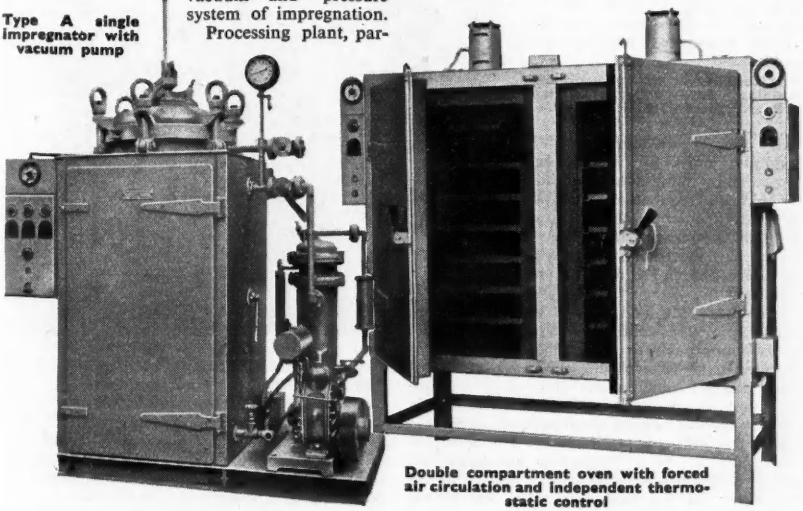


Self-contained duplex vacuum and pressure impregnating unit

THE importance of thoroughly impregnating the insulation of armatures, coils, transformers and similar electrical equipment to withstand tropical and other difficult climatic conditions needs no emphasis. Dipping methods, although widely practised, are frequently little more than a surface treatment and cannot ensure the removal of all traces of moisture and the complete penetration of insulating medium which is possible with the vacuum and pressure system of impregnation. Processing plant, particularly for dealing with small components, has not been too easily obtainable in the past, but this obstacle has been remedied by the availability of a range of self-contained "B-W" all-electric impregnating equipment which has been developed over the last few years by Barlow-Whitney, Ltd., Coombe Road, Neasden, London, N.W.10.

Alternative types are manufactured with one or two impregnating vessels in a range of standard sizes from 12 to 36 in. diameter for use with cold varnish or hot waxes and compounds. They have the merit of being transportable as complete units and, being simple to install, their positions can be easily altered to suit modifications of the production line. The impregnators are of the vertical type constructed to work at 60 lb/sq in. pressure, or higher if specified, and down to 30 in. Hg vacuum. The detachable cover is arranged to swing clear for loading and is fitted with two sight glasses for viewing the interior (one of them illuminated) as well as a safety valve and pressure release cock. The vessel has thermostatically controlled electric heating, the

Type A single impregnator with vacuum pump



Double compartment oven with forced air circulation and independent thermostatic control

elements being of the metalclad industrial type.

The varnish or wax storage tank is placed directly below the impregnator in smaller plants (type A) or alongside at the same level for larger plants (type B) and housed in the common well-lagged steel casing with inspection door. Duplex plant, consisting of two impregnators, is normally served by a common storage tank at the back, but separate tanks can be supplied for each vessel when preferred.

Connections are made with solid drawn steel pipe and " Audco " oil-sealed isolating valves are fitted. The insulating medium is transferred to the impregnator by vacuum and returned to the tank by gravity or compressed air. Thermostatically controlled electric heating is provided in the storage tank and to interconnecting pipes if the nature of the insulating medium so demands.

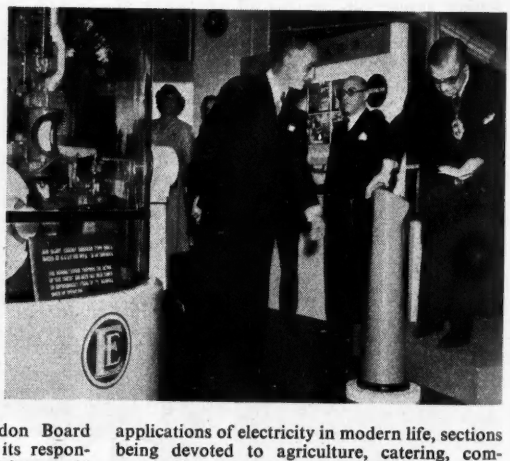
A catch pot is inserted in the vacuum line to trap the vapours released, or any excess of the insulating medium in the event of the impregnator being accidentally overfilled. Vacuum pumps of the rotary type, designed to work at high vacua, are fitted with special lubrication. They are motor driven by means of a V-belt and mounted on the side or back of plant according to type. Motor-driven compressors are also supplied when a source of compressed air is not already available They are complete with air receiver and all accessories, including automatic unloader and pressure switch. A moisture trap is also connected in the air line. The electrical control gear is neatly housed in a sheet-steel enclosure on the side wall or in a central position on the plant. Temperature indicators and vacuum-pressure gauges are fitted as standard.

Electrically heated and thermostatically controlled " B-W " ovens are also supplied for preheating, drying and final baking. They are well lagged and incorporate a forced air circulation system to ensure both ample ventilation and uniformity of temperature.

Electricity Service Centre

Lord Mayor of London Opens New Premises

THE London Electricity Board's new electricity service centre at 3-4, Queen Street, E.C.4, referred to in our last week's issue was officially opened last Friday by the Lord Mayor of London, Sir Frederick Wells, when he pressed a button operating a demonstration 6·6-kV, 350-MVA air-blast circuit breaker. Explaining the purposes of the new building, Mr. H. J. Randall, chairman of the London Board, said that the service centre was available to advise on all electrical matters not only consumers in the area but anyone in this country or overseas. The exhibits, most of which were provided by manufacturers, would be changed frequently to maintain interest. Special attention would be paid to educating the public as to the part electricity was playing in the economic recovery of the country.



The Lord Mayor of London officially opening the London Electricity Board's electricity service centre

The Lord Mayor said that the opening of the centre indicated a new approach to the subject of electricity service and the London Board was taking a much wider view of its responsibilities. Our present standard of living would be impossible without electricity. Few people realized its full capabilities and it was right that they should have an opportunity of seeing the latest developments and obtain first-hand information of the best and most economical methods of using electricity. The Lord Mayor was thanked for performing the ceremony by Mr. E. A. Mills, deputy-chairman of the London Board.

With the aid of photographs, murals and actual apparatus, the service centre draws attention in a compelling fashion to the various applications of electricity in modern life, sections being devoted to agriculture, catering, communications, domestic uses (including a model kitchen), electronics, entertainment, health, industry, transport, lighting and ventilation. Indications are also given of the generation and distribution problems of supplying electricity to 11 million consumers.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The Revo Electric Co., Ltd.—Speaking at the recent annual meeting, Mr. B. Silcock (chairman) said that seven units of auxiliary electrical generating equipment were now in commission at their factories, and as a result normal shifts were worked and staggered hours avoided. Heating equipment had also been converted to oil burning, including a new system of space heating. A new department had been created for the production of diecast metal components with the use of pressure and gravity feed machines.

In the concrete street lighting lamp column department, replanning and improved methods of mixing and fabricating had been introduced, and a range of columns and brackets which had been approved by the Royal Fine Arts Commission would soon be in production. Special attention had been accorded to the development of lighting equipment for use in mines and improved production lines in the domestic appliance sections were now in full operation.

An extensive drive was being made to expand their export trade and by the expansion of established agencies and the appointment of new agents they were now represented in many parts of the world. Two new models of electric cookers had recently been introduced in the South African and Australian markets, while fluorescent lighting units had been developed to combat American competition.

Edgar Allen & Co., Ltd., report a trading profit for the year ended 3rd April last of £421,568, as compared with £135,645 for the preceding year, to which is added interest and dividends (including £50,847 non-recurring distribution from one company) of £67,001, and profits from subsidiary companies of £3,908, making £492,487 (against £153,838). After providing for depreciation, etc., and adding £25,000 investment reserve in subsidiary no longer required and £6,050 excess profits tax refund, it is proposed to allocate £213,500 for taxation and £145,000 to reserves. After paying an ordinary dividend for the year of 12½ per cent (same) £86,291 is carried forward (against £45,466 brought in).

Cable & Wireless, Ltd., in their report for 1947, the first year in which they had operated as a nationalized industry, record that revenue of the company and its subsidiaries fell from £11,914,281 to £11,057,129 and gross profit from £3,530,854 to £1,724,090. The principal items contributing to an increase from £8,383,427 to £9,333,039 in expenditure were working expenses at stations £5,499,612 (£5,069,320), maintenance of cables, £1,481,381 (£1,382,414) and depreciation of cables and ships, taxation abroad, etc., £1,062,234 (£661,725). Provision for income tax and profits tax showed a big drop, being £944,269, compared with £2,150,616 for income tax and E.P.T. in 1946. Special appropriations are made for cable depreciation (£191,741) and renewal of assets (£183,259). It is proposed to reduce the dividend from 5½ to 4 per cent.

Scottish Cables, Ltd.—Details of the company were published this week in connection with an application for the quotation of the shares in London and Glasgow. The company was formed in 1937 by Mr. William Fraser, who is the present governing chairman, and was converted into a public company last March. The authorized capital is £550,000 (£450,000 issued and fully paid). Important additions to plant were made in 1946 and in 1947-48 profits of £186,724 (before taxation) were earned.

The Hackbridge & Hewittic Electric Co., Ltd., announces a consolidated profit for the year to 31st March last, of £132,495, before tax provision of £79,500 (against £77,123, before tax provision of £28,200). It is proposed to pay a final ordinary dividend of 8 per cent less tax, making 12 per cent less tax, for the year. The previous dividend is not comparable, in view of the scheme of amalgamation involving capital reorganization on 20th March, 1947.

The Morgan Crucible Co., Ltd., reports a profit for the year ended 31st March last, after providing for tax, of £522,937 (against £441,834 for 1946-47) to which is added £100,831 brought in. It is proposed to pay a final ordinary dividend of 8¾ per cent., maintaining the distribution for the year at 12¼ per cent, and to place £100,000 to rehabilitation reserve, and £175,000 to general reserve. The balance carried forward is £119,723.

The Globe Telegraph & Trust Co., Ltd., reports a net revenue for the year ended 30th June last of £191,329, as compared with £197,003 for the preceding year. As already announced the final ordinary dividend is 2 per cent, making 5 per cent, tax free for the year. The balance carried forward is £185,311 (against £171,454 brought in).

Richardsons, Westgarth & Co., Ltd., report a net profit for the year ended 31st March last of £161,981, as compared with £127,419 for the preceding year. It is proposed to pay an ordinary dividend for the year of 8 per cent, less tax, plus an additional 2 per cent, not subject to tax, from capital reserve. The distribution for 1946-47 was 10 per cent, less tax.

Davey, Paxman & Co., Ltd., report a trading profit for the year ended 31st March last of £253,465, as compared with £251,696 for 1946-47, and a net profit of £75,413 (against £43,112). The dividend for the year is 10 per

cent, and the balance carried forward is £21,986 (against £10,823 brought in).

The Hydro-Electric Securities Corporation, Ltd., reports a gross income of $771,447, for 1947 (against $775,019 for 1946) and a net income of $578,892 (against $620,567), to which is added $2,542,129 brought in. After deducting the preferred dividend of 5 per cent (same), a balance of $2,791,460 is carried forward.

The Nigerian Electricity Supply Corporation, Ltd., shows a net profit for the year ended 29th February last of £68,887 (against £65,299). The final dividend is 4 per cent, plus a bonus of 2 per cent, maintaining the distribution for the year at 10 per cent.

New Companies

D. & M. Cunningham Ltd.—Registered 16th July. Capital, £1,000. Electrical engineers and contractors, etc. Directors: D.Cunningham and M. Cunningham. Secretary: D. MacGregor. Regd. office: 41, Seabourne Road, Southbourne, Bournemouth.

J. H. Boardley, Ltd.—Registered 16th July. Capital, £1,000. Manufacturers of, and dealers in, dynamos, motors, armatures, magnetos, batteries, etc. Directors: J. H. Boardley and W. B. Boardley. Secretary: A. B. Jones. Regd. office: 80, Copthall Road, Handsworth, Birmingham, 21.

Cable & Electric Industries, Ltd.—Registered 17th July. Capital, £100. Dealers in debentures and other securities, etc. Directors: H. Chinnery and Joyce O. Whiteman. Secretary: N. R. Oldaker. Regd. office: 133-136, High Holborn, W.C.1.

Derry Patents, Ltd.—Registered 28th June. Capital, £100. Dealers in, and manufacturers of, electrical equipment of all kinds, etc. Permanent directors: C. W. Trist, J. R. Malby, N. C. Elliott and R. A. Andrews. Regd. office: 87-9, Aldgate High Street, E.C.3.

Alfred Appleby & Co. (Electrical), Ltd.—Registered 29th June. Capital, £1,000. Electrical engineers and contractors, etc. Directors: A. D. Appleby, and J. J. Appleby. Regd. office: 5, Crown Passage, Kingston-on-Thames.

Increases of Capital

Airedale Electrical & Manufacturing Co., Ltd.—Increased by £14,000, in 4,000 ordinary and 10,000 6 per cent redeemable cumulative preference shares of £1 each, beyond the registered capital of £6,000.

Electro Technical Industries, Ltd.—Capital increased by £5,000, in 2,500 ordinary and 2,500 preference shares of £1 each, beyond the registered capital of £15,000.

Mawdsley's, Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £100,000. On 26th April the Southern Areas Electric Corporation, Ltd., held 99,485 shares out of 100,000 issued.

Bakelite, Ltd.—Increased by £150,000, in £1 shares, beyond the registered capital of £850,000.

Beacon Electrical Co., Ltd.—Increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

National Time Recorder Co., Ltd.—Increased by £35,000, in 10,000 ordinary and 25,000 6½ per cent preference shares of £1, beyond the registered capital of £15,000.

Victor Electrics, Ltd.—Increased by £15,000, in £1 shares, beyond the registered capital of £5,000.

F. J. Wakeford & Co., Ltd.—Increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Johnson & Co. (Bradford), Ltd.—Increased by £2,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Alneco, Ltd.—Increased by £2,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Electrocord, Ltd.—Increased by £3,000, in £1 shares, beyond the registered capital of £2,000.

Receiver Appointed

British-Made Electrics, Ltd.—F. M. Kellett, 31, Mosley Street, Newcastle-on-Tyne, was appointed receiver and/or manager on 28th June, under powers contained in debenture dated 22nd July, 1946.

Liquidations

Isle of Thanet Electric Supply Co., Ltd.—Members' voluntary winding-up. Liquidator, Mr. C. Collins, 36, Victoria Street, London, S.W.1.

Bankruptcies

H. W. Laker, residing and carrying on business at 3, The Parade, Station Road, New Milton, Hants, under the name of New Milton Electrical Engineers, and previously residing and carrying on business at "Beulah," Manor Road, New Milton, Hants, as H. W. Laker & Co., electrical engineers and contractors.—First meeting 30th July at the Official Receiver's office, 10, Rockstone Place, Southampton. Public examination, 13th October at the County Court, Castle Square, Southampton.

H. R. Aarons, lately carrying on business as Radco Co. (Wholesalers), Leyton, at 764, Lea Bridge Road, London, E.17, and at 35, Tallack Road, Leyton, electrical wholesaler.—Trustee, Mr. B. Phillips, 76, New Cavendish Street, London, W.1, appointed 15th July, 1948.

A. Lawson (formerly A. Lotterman), 261, Park West, Edgware Road, W.1, electrical engineer.—Last day for receiving proofs for dividend 3rd August. Trustee, Mr. F. H. Langmaid, Bankruptcy Buildings, Carey Street, London, W.C.2, Official Receiver.

STOCKS AND SHARES

WITH the political atmosphere on the Continent somewhat less tense, Stock Exchange markets experienced a recovery in most departments, though it cannot be said that business showed any definite disposition to expand. This is, of course, a quiet time of year, even under normal conditions: nobody expects activity in stocks and shares at the approach of August and the holiday season. The fall in prices, however, has been stayed. The general tendency amongst industrial issues is better—owing, perhaps, to selling pressure being relaxed, rather than to any pronounced anxiety on the part of capital to enter the markets as a buyer. The atmosphere is still heavy with suspense, and the uncertainty persists to an extent which renders prospective buyers shy of taking action.

New Issues

Dealings were due to begin this week in the 5 per cent preference and £1 ordinary shares of Christy Brothers (Chelmsford). Both classes of shares were publicly offered at par, the lists opening last Friday. This is a new enterprise, formed to take over and expand the assets remaining to the former Christy Brothers (now dissolved) after nationalization of the electricity supply interests. As a nucleus, the new firm has the old company's engineering interests, a wireless relay business and a recently acquired subsidiary, Christy & Norris. A dividend of 5 per cent on the ordinary is forecast. Imperial Chemical Industries' offer of new shares at 40s. 6d. is about 5s. below the market price of the old. Ordinary stockholders will not receive their provisional allotments—on a one-for-five basis—until 18th August, and will have until 14th September to make up their minds about acceptance. Over £20 million new money is involved in the issue, which is likely, therefore, to exercise a marked influence on conditions for the next month or two.

Revo Meeting

Mr. Bertram Silcock dealt with points of general interest at Revo Electric's annual meeting. Two of them concerned the company's reserves of £30,000 for plant replacement, and of £100,000 against the contingency of a fall in prices. High prices are partly responsible for the appearance of swollen stock-in-trade figures in many 1947 balance sheets. At the same time, the cost of replacing equipment has risen to a level which renders inadequate the scale of depreciation allowed for income-tax purposes. Companies are being obliged to take precautions on these accounts, but have to do so from profits already heavily taxed. From the same source, they are expected to plough back capital for working purposes and expansion. Having done this, they meet ignorant criticism about excessive earnings on the original capital. Mr. Silcock showed that the 27½ per cent ordinary distribution represented no more than 4½ per cent net on the capital employed, even on the basis of book values.

Pye's Increased Profits

News earlier this month of a 70 per cent expansion in the Pye company's profits for 1947-48 provided welcome relief to the radio market, sorely tried by a succession of depressing reports from the trade. As was only to be expected, nothing of the increase is being passed on by way of dividend. Deferred stockholders have, nevertheless, the satisfaction of seeing their regular 25 per cent reward covered by group earnings equal, before taxes, to the whole of the parent company's issued deferred capital. From the surplus, £12,500 is appropriated to a dividend reserve and the group carry-forward is raised by £80,000. Since the announcement, the 5s. deferred have strengthened to 20s., at which they pay 6¼ per cent on the money. There is little market in the 7 per cent preferred, which participate, as usual, up to their maximum of 10 per cent and, at 30s., are on a yield basis of £6 13s. 4d. per cent.

The Week's Price Changes

The largest recovery on the week is shown by British Electric Traction deferred, which at 1,625 is 50 points to the good. Murex at 86s. 3d. and Tube Investments, 5⅞, are both 2s. 6d. up, and Babcock at 65s. 6d. have put on 1s. 9d. E.M.I. are better at 16s. 9d. Lancashire Dynamo fell 2s. 6d. to 95s. before rallying to £5. Aberdare Cables of South Africa hardened to 15s. Telegraph Constructions improved to 45s., Henley's to 23s. 6d. and Newman Industries to 7s. Against the rises there are declines to 95s. in Hopkinsons and to 32s. 6d. in Telegraph Condensers. A number of small losses occurred, Ever Ready at 35s. 9d. being ⅛ lower. Ward & Goldstone, 57s., 6d., Anglo Portuguese Telegraph, 30s., and Canadian Marconi, 12s. 6d., are similarly down. British Electric Resistance eased off to 3s. 6d.

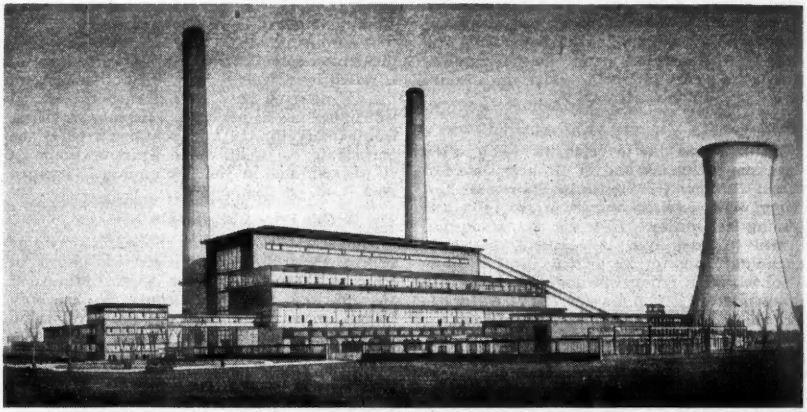
Miscellaneous Matters

Protest has arisen from holders of the preference shares in Victoria Falls and Power Company against the assumption that the stock will receive only 6 per cent from 1st January last to the end of this year, instead of the full 10 per cent which its participating rights allowed. The price of the shares keeps about 20s. Cable & Wireless, the operating company, announces a fall in the gross profits for 1946, the previous year's £3½ million being reduced to £1¾ million. The dividend is lowered from 5½ per cent to 4 per cent. This makes, of course, no difference to Cable & Wireless (Holding), whose stocks are negotiated in the Stock Exchange. The ordinary this week has risen 7 points to 186½. In view of the company having been nationalized, mild surprise is expressed that the Government should have bothered to publish the results of Cable & Wireless (operating).

ELECTRICITY SUPPLY

The Huncoat Station. Opposition to Scottish Schemes.

Accrington.—HUNCOAT GENERATING STATION.—The architectural design for a new generating station which the British Electricity Authority is to construct at Huncoat, Accrington, at an estimated cost of £6,500,000, has been approved by the Royal Fine Art Commission. The station, on the site of which clearance work has begun, is being designed for an ultimate capacity of 120,000 kW. It will contain two 30,000-kW turbo-alternators initially, generating at 11 kV stepped up to 33 kV through machine transformers, together with three pulverized-fuel-fired boilers each of a capacity of 305,000 lb of steam per hour, with electrostatic dust collectors. Steam conditions at the turbine stop valve will be 600 lb per sq in. and 850 deg F. For the first section there will be one chimney 350 ft high and one cooling tower 300 ft high with a capacity of 3 million gal. of water per hour. The principal consulting engineers are Messrs. Kennedy & Donkin, to whom Mouchel & Partners, Ltd., are responsible for civil engineering works. The architect of the station is Mr. R. N. MacKellar, F.R.I.B.A.



Architect's drawing of the new Huncoat generating station

Billingham-on-Tees.—HOUSE INSTALLATIONS.—The question of installing electricity in houses not already supplied on the Cowpen Lane and Belasis Lane housing estates is being considered by the Urban District Council. Specifications have been prepared and tenders are to be obtained for the work. The Council is also seeking authority to install electric cookers.

Carlisle.—STREET LIGHTING IMPROVEMENTS.—The City Council has applied for sanction to borrow £1,670 for street lighting improvements in the Caldewgate area.

Edinburgh.—ELECTRICITY DEPARTMENT'S SURPLUS.—The last ten months of the Electricity Department's trading showed a £35,304 surplus. With a balance of £92,586 at the beginning of the year there was therefore for transfer on 1st April £127,890, a very good send-off for the South-East Scotland Electricity Board, commented the city treasurer. The Corporation is to receive £166,000 from the fund created for the payment in lieu of rates on the nationalized electricity and transport undertakings.

Kilmarnock.—SMOKE ABATEMENT.—The Corporation Public Health Committee is to discuss with representatives of the British Electricity Authority proposals for alleviating smoke nuisance at the local electricity station.

Meriden. — STREET LIGHTING. — Mercury vapour lamps are to be provided on the Coventry-Birmingham road and on the Tamworth road.

Middlesbrough.—HOUSING ESTATE LIGHTING.—The Council is seeking sanction to erect ninety-five electric street lamps on housing estates.

Moffat.—TUBULAR HEATING.—The Town Council is considering fitting tubular heating in the Town Hall and Council Chambers.

Scotland.—OPPOSITION TO HYDRO-ELECTRIC SCHEMES.—Eight objections have been lodged to the Moriston project of the North of Scotland Hydro-Electric Board (Constructional Scheme No. 23) and eleven to the Garry project (Constructional Scheme No. 24). The objectors include Inverness Town Council and Inverness County Council (both schemes) and Ross and Cromarty County Council (Moriston).

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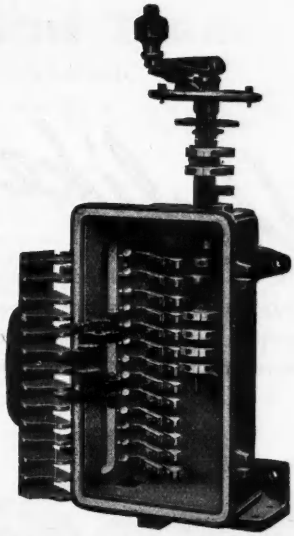

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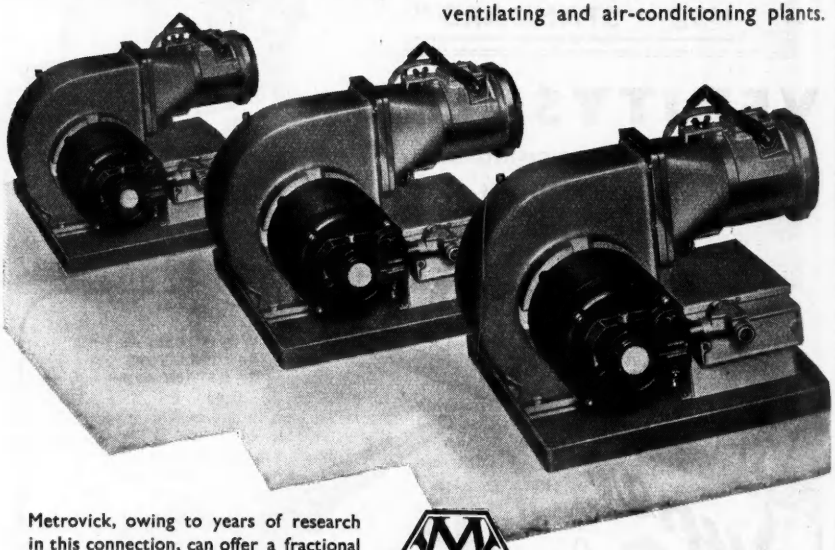
The old Victorian cliché that little boys should be seen and not heard was merely wishful thinking. Unlike little boys, however, these Metrovick fractional horse-power motors are quiet running. They are ideal for driving unit heaters, small pumps and fans used in heating, ventilating and air-conditioning plants.



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See Stand 287E, Empire Hall Gallery, MACHINE TOOL AND ENGINEERING EXHIBITION, OLYMPIA
26th August to 11th September

Overseas Electrical Trade

Half-Year's Exports Total £49 Million

JUNE, with twenty-five working days, provided a new record in the value of British electrical equipment exported. This may occasion surprise in view of the fact that shipping was seriously interfered with by the London dock strike in that month. It is explained in the *Board of Trade Journal*, however, that because of the time allowed between shipments and the receipt of the documents the strike will have had little effect on the month's returns—presumably it will be reflected in the July figures.

Compared with May—the previous highest—the June value for electrical exports was £391,000 greater at £8·9 million, the improvement being wholly in the goods and apparatus section in which there was a rise of £709,000. Cable manufacturers continue to expand the high level

Table I.—Electrical Exports and Imports

Class	Exports			Imports		
	June, 1948	June, 1947	Monthly Av., 1938	June, 1948	June, 1947	Monthly, Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	5,876	38,848	17,289			
Ditto, not submarine	766,794	199,282	71,803			
Wires and cables, rubber insulated	504,055	355,601	117,533			
Ditto, cotton, silk or artificial silk insulated	73,330	38,525	†	12,758	3,863	31,246
Ditto, enamel, glass or asbestos insulated	37,812	20,409	†			
Ditto, paper insulated	732,894	290,862	103,457			
Ditto, other	99,614	88,154	49,799			
Commercial radio apparatus	221,710	104,687	28,296	46,624	10,135	58,018
Domestic radio apparatus	349,935	337,297	36,755			
Telegraph, telephone and signalling apparatus	1,071,248	401,159	242,716	9,082	8,428	9,243
Other radio, etc., apparatus	326,418	235,211	57,848	—	—	—
Radio valves	200,939	120,186	41,272	8,346	39,461	10,893
Electric carbons, furnace	*	*	*	19,708	37,905	4,054
Ditto, other	*	*	*	1,673	3,985	2,301
Electric lamps, not exceeding 24 V	17,594	14,092	49,440	7,789	3,888	10,265
Discharge lamps	27,843	17,841				
Other lamps	107,025	71,426				
Other lighting apparatus	425,085	247,579	48,565	8,436	3,781	38,662
Primary batteries	58,936	31,283	13,572	*	*	*
Accumulators for motor vehicles	141,442	99,597	16,418	*	*	*
Ditto, traction	13,081					
Ditto, radio	3,355	60,184	12,456	*	*	*
Other portable accumulators	54,451					
All other accumulators	42,584	16,288	19,773	*	*	*
Parts and accessories	47,970	28,965	—	*	*	*
Cooking apparatus and elements	167,043	82,947	16,600	*	*	*
Heating apparatus and elements	76,957	126,143	14,064	*	*	*
Other parts and accessories	38,411	27,292	—	*	*	*
Commercial electrical instruments	70,555	77,948	15,878	32,004	33,782	32,057
House service meters	185,041	58,035	15,791			
Other electrical instruments	90,506	71,030	9,612			
Electro-medical apparatus (not X-ray)	28,021	28,896	3,038	*	*	*
X-ray apparatus, tubes and parts	39,591	38,595	4,881	30,689	19,824	9,734
Insulating cloth and tape	55,855	46,202	7,038	*	*	*
Other insulating materials	81,411	75,635	12,305	*	*	*
Unclassified goods and apparatus	411,108	277,534	108,085	51,889	17,670	56,529
Generators, up to 200 kW	237,984	113,396	38,071	*	*	*
Ditto, over 200 kW	69,451	437,840	119,079	*	*	*
Ditto, parts	194,329	128,508	—	*	*	*
Motors, railway and tramway	28,440	75	15,977			
Ditto, other, up to ¼ h.p.	85,719	32,510	9,001			
Ditto, from ¼ to 1 h.p.	54,636	25,964	2,470	23,487	15,098	26,033
Ditto, from 1 to 250 h.p.	321,933	217,886	96,637			
Ditto, over 250 h.p.	20,861	2,822	20,960			
Ditto, parts	50,075	25,639	—			
Converting machinery	2,195	2,735	101,304			
Transformers, including coils	296,584	268,520				
Rectifiers for power house use	12,217	7,702	3,463			
Motor starting and controlling gear	145,330	93,204	50,866	39,043	55,089	14,455
Switchgear and switchboards (not telegraph or telephone)	540,898	293,083	184,533			
Other electrical machinery	32,516	13,665	15,497			
Vacuum cleaners and parts	205,142	235,738	26,662	16,713	1,463	24,627
Other electrically operated portable appliances	42,241	20,295	10,394			
Total	8,915,041	5,685,315	1,829,198	308,241	254,372	328,117

*Not classified separately. † Not separately distinguished in 1938.

of their overseas trade and last month there were advances in all classes of wires and cables, with an aggregate of £2·2 million against May's £1·8 million. In the six months up to the end of June the value of such exports has amounted to £10·8 million compared with £5·5 million in the first half of last year. Another type of equipment contributing substantially to the export drive is telegraph and telephone apparatus with a total value for the six months of £5·1 million (£2·9 million up to June last year).

In the second quarter of the year the value of electrical exports was £25·9 million, making £49 million for the half year (this compares with £32·3 million and £11 million in six-month periods of 1947 and 1938). An analysis of exports during the past quarter by volume shows that shipments of radio sets (numbering 88,600) made a partial recovery from the previous quarter's low level of 75,200. Electrical machinery and machine tools were the only items in the machinery section which declined, the volume of exports of the former in the second quarter (17,100 tons) being the lowest for a year.

From the accompanying analysis of destinations (goods and apparatus only) it will be seen that South Africa remained the largest customer (£924,038), with Australia second (£612,793). Among foreign countries Sweden is outstanding—for the six months of the year goods worth £1,799,979 have been sent there against £541,230 last year and only £89,690 in a half of 1938.

Imports of electrical equipment in June were somewhat higher than a year ago but remained below the 1938 amount. The countries of origin (goods and apparatus) with comparative figures for June, 1947, were as follows:—United States, £90,766 (£93,019); Canada, £27,003 (£34,329); Netherlands, £14,338 (£24,424); Switzerland, £13,651 (£9,327); other British countries, £40,400 (£1,706); other foreign countries, £42,840 (£19,917).

Table II.—Distribution of Exports of Electrical Goods and Apparatus

Destination	June, 1948	June, 1947	Monthly Av., 1938
	£	£	£
Eire	225,102	174,081	37,726
Channel Islands ..	30,320	38,592	12,177
Malta and Gozo ..	23,591	16,482	5,873
Cyprus	14,732	27,047	1,373
Palestine	10,952	133,061	8,426
British West Africa ..	74,048	46,530	12,889
Union of South Africa	924,038	569,787	162,584
Southern Rhodesia ..	67,439	69,450	9,632
British East Africa ..	114,110	62,037	7,893
India, Pakistan, etc. ..	647,337	340,891	123,789
British Malaya ..	151,107	165,734	32,792
Ceylon	54,630	20,829	15,048
Hong Kong	98,493	48,704	12,939
Australia	612,793	184,401	197,366
New Zealand ..	286,350	192,852	96,225
Canada	87,261	44,532	12,547
British West Indies ..	55,962	31,916	12,954
Anglo-Egyptian Sudan	28,601	5,611	2,989
Other British Countries	85,230	31,373	11,030
Soviet Union	1,834	8,446	36,781
Finland	57,224	16,332	5,969
Sweden	515,077	122,596	14,948
Norway	170,182	166,996	12,881
Iceland	5,226	8,292	2,796
Denmark	93,628	97,593	18,907
Poland	12,119	20,751	9,702
Netherlands	107,971	84,838	22,010
Belgium	97,330	104,479	11,208
France	52,556	18,967	16,082
Switzerland	26,407	25,586	3,768
Portugal	158,551	54,290	6,512
Spain	58,775	79,291	3,813
Czechoslovakia ..	24,574	20,630	7,205
Yugoslavia	16,002	30,228	1,475
Greece	38,308	22,068	4,926
Turkey	199,486	67,216	7,684
Dutch East Indies ..	19,180	2,331	2,692
Dutch West Indies ..	11,420	5,878	830
Portuguese East Africa	28,514	19,562	6,942
Lebanon	16,531	12,508	—
Egypt	263,747	85,524	13,176
Iraq	130,292	53,525	5,530
Iran	164,762	60,991	16,345
Burma	97,542	44,879	5,337
China	12,660	40,650	4,116
United States of America	4,446	8,439	5,839
Mexico	2,269	20,189	1,466
Colombia	22,054	2,276	845
Venezuela	70,949	37,931	2,936
Chile	10,888	18,753	6,635
Brazil	142,820	37,047	11,164
Uruguay	23,289	9,795	1,790
Argentine Republic ..	199,925	87,500	45,452
Other Foreign Countries	125,856	65,446	40,270
Total ..	6,574,490	3,765,733	1,134,284

Table III.—Comparison with End-1948 Target Figures

Commodity	June, 1948	End-1948 Target
	Millions of £	
Electrical goods and apparatus:		
Wires and cables	2·22	1·95
Radio apparatus	1·10	1·20
Telephone and telegraph apparatus	1·07	1·25*
Lighting apparatus ..	0·58	0·82
Other electrical goods ..	1·60	1·85
Total	6·57	7·07*
Machinery:		
Boilers and boiler-house plant	0·98	1·08
Electrical machinery ..	2·23	2·40*
Other machinery	17·75	18·58*
Total ..	20·96	22·06*

*Revised figures

Vacuum Cleaner Market in Eire

A REPORT on the market for vacuum cleaners in Eire by the United Kingdom Trade Commissioner, Dublin) states that there is no local production. Inquiries show that United Kingdom manufacturers have completely recovered the market and the demand may be expected to increase in the country districts as electrification spreads. Prices and quality of United Kingdom products are said to be very satisfactory. It is not anticipated that United Kingdom manufacturers will have any difficulty in maintaining the bulk of the trade.

NEW BOOKS

A.C. Protective Gear. Treatise on Electronics.

Protective Methods for A.C. Power Circuits and Machines. By H. M. Marklew, M.SC.(ENG.) and J. A. Collier, B.SC.(ENG.). Pp. 136; figs. 98; index. Blackie & Son, Ltd., 66, Chandos Place, W.C.2. Price 10s.

This country was the birthplace of balanced discriminative protection and pioneer work was done on the North-East Coast. At present the grid system alone uses over 7,000 relays and any fault on the 132-kV section involves clearance of up to 10,000 A. A staff of specialist engineers is constantly employed in devising, installing and maintaining protective gear.

There is need for good basic textbooks to provide information for those entering the protective gear field. The volume under review is designed to meet this need. It describes general principles of protection, relays and associated transformers, the conventional systems (pilot, distance, time) as applied to machines, transformers and overhead line or cable circuits, fuses, motor protection and fire protection. Sufficient indications of theoretical principles are provided to enable anyone with a reasonable educational background to work out in detail the basis of any type of relay in common use.

Admirably clear line diagrams illustrate all the important types of gear and more complete ones in an appendix prepare the debutant for the actual drawings used in practice, which are beyond the scope of an elementary textbook. The descriptive matter is readily understandable and the amount of jargon included is happily restricted to terms such as " back-up protection," " kick-fuses " and manufacturers' designations like " Solkor, Translay, Dualock." The only serious omission is the absence of any reference to phase balancing systems, which seem likely to displace amplitude balance systems for many applications. The book fulfils its purpose admirably and should greatly simplify entry into the protective gear field.—C.W.M.

Electronics. By F. G. Spreadbury. Pp. 698; figs. and index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, Kingsway, W.C.2. Price 55s.

This is an ambitious book. There are twenty chapters, the subject of each of which has frequently necessitated a lengthy volume for its adequate treatment. As well as chapters on atomic physics, X-rays, electron optics, luminescence, gaseous electrical conduction and other fundamentals, all the more electronic devices, such as hard and gas-filled valves, rectifiers, cathode-ray tubes, photo-electric cells and discharge lamps are discussed in more detail than one would expect in a single volume. Among miscellaneous apparatus dealt with more briefly are the cyclotron and the electron microscope. With such condensation, exhaustive treatment must not be expected, but the book can be recommended for those engineers and technicians who wish to have a reasonably clear idea of how these devices work and of their theoretical background. The author assumes a familiarity with the principal branches of physics, and the mathematics used requires an elementary knowledge of the calculus. One could criticize some of the mathematical treatment as being more plausible and descriptive than analytical, but this probably will not worry those for whom the book is suitable. The volume is well produced, the printing clear and the diagrams adequate.—V.J.F.

Electrical Measurements. General editor E. Molloy. Pp. 103; figs. 78; index. George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Price 5s.

The publication of this book is justified by the inclusion of details of some of the newer electrical instruments on which information at the present time is somewhat scattered. The treatment of the subject is such that it will appeal to those interested in instrumentation and testing, the theory and design of instruments being almost excluded.

The outstanding feature of the whole book is the chapter devoted to the electrical measurement of non-electrical quantities. In it are details of instruments available for materials testing, such as strain gauges, instruments for distance indication, stroboscopes, smoke density meters and a number of the lesser known instruments. There is a good chapter on a.c. bridge methods and the chapter on valve voltmeters is also worthy of mention. Anyone wishing to make a rapid survey of electricity meters and meter testing without consulting a specialized work will find about a quarter of the book devoted to this subject, the information being remarkably complete.

By using small type the publishers have included in a hundred pages material which would normally fill a much larger and more expensive book. It is refreshing to find that errors and misinformation are almost non-existent.—H.A.

Magnetic Materials. By F. Brailsford, PH.D., A.M.I.E.E. Pp. 156; figs. 86. Methuen & Co., Ltd., 36, Essex Street, Strand, London, W.C.2. Price 6s.

This pocket-size booklet is one of the publisher's series of monographs outlining and summarizing physical subjects. The information given is very brief, but at the end of each chapter there are references to books, original papers and articles consulted by the author, who has also included some Metro-Vickers information not hitherto published.—W.O.F.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

PHANTOM Convoys, Inc.—"Control mechanism for boats responsive to radio impulses." 17087. 1st September, 1942. (604504.)

F. Sigmund and W. S. Hlavin.—"Wound cores for dynamo-electric machines." 17301. 20th October, 1943. (604744.) "Core for a dynamo-electric machine." 18700. 10th November, 1943. (604664.)

Philips Lamps, Ltd.—"Thermionic tubes." 17661. 6th August, 1942. (604505.)

1944

Standard Telephones & Cables, Ltd.—"Composite selenium electrode." 2273. 5th January, 1943. (604746.)

Sperry Gyroscope Co., Inc.—"Echo type radio systems." 2606. 15th February, 1943. (604747.)

Electric Transmission, Ltd., and K. Dannenberg.—"Electric fuses." 6393. 5th April, 1944. (604748.)

S. I. Hitchcock.—"Combined permanent magnet type electric motor and generator." 21769. 6th December, 1945. (604753.)

J. B. Pierce Foundation.—"Circuit-breaker with temperature compensation." 21965. 8th January, 1944. (604754.)

1945

W. S. Elliott, A. E. Bailey and R. S. Webley.—"Radar systems." 5725/7. 7th March, 1945. (604671/3.)

Philco Radio & Television Corporation.—"Television systems and receivers." 6676. 30th May, 1944. (604759.) "Magnetized wire recording and reproducing systems." 33043. 19th December, 1944. (604859.)

General Electric Co., Ltd., and A. Bloch.—"Circuits for electric discharge lamps." 6701. 16th March, 1945. (604513.)

Western Electric Co., Inc.—"Electric discharge devices." 7462. 23rd March, 1944. (604674.)

W. B. Lewis and R. H. A. Carter.—"Radio-location apparatus." 7512. 24th March, 1945. (604592.)

S. S. Cramer.—"Electromagnet structures." 8439. 28th March, 1944. (604676.)

Standard Telephones & Cables, Ltd.—"Telephone exchange systems." 9287. 15th May, 1944. (604593.) "Method and means for the transmission of low-frequency calls in telecommunication systems." 33145. 26th December, 1944. (604877.) "Coupled circuits." 28th March, 1945. (604652.)

J. Bernard.—"High tension electromagnetic ignition equipment for internal-combustion engines." 15180. 23rd April, 1943. (Cognate application 15181/45.) (604764.)

Marconi's Wireless Telegraph Co., Ltd.—"Deflection circuits for cathode-ray oscilloscopes or the like." 13072. 25th May, 1944. (604763.)

Eureka Vacuum Cleaners Co.—"Garbage reducing apparatus for attachment to a sink." 13994. 18th November, 1944. (604516.)

Aircraft-Marine Products, Inc.—"Terminals for electrical connectors." 14666. 10th April, 1944. (Cognate application 14667/45.) (604684.)

Horton Manufacturing Co.—"Ironing-machines." 15393. 16th June, 1944. (604518.)

British Thomson-Houston Co., Ltd., and J. H. Walker.—"A.c. generators." 16741. 2nd July, 1945. (604521.)

Dowsing Co. (Electrical Manufacturers), Ltd., E. W. Clark and F. W. J. Cripps.—"Electrical heating of fabrics and other materials." 18678. 20th July, 1945. (604766.)

Soc. d'Applications Générales d'Electricité et de Mecanique Sagem.—"Polarized electromagnet." 19369. 8th August, 1944. (604767.)

Philco Corporation.—"Electrical systems for generating sawtooth waves." 22349. 30th August, 1944. (604524.)

O. Margulies and J. Mehl.—"Method of and apparatus for gathering magnetic articles in predetermined quantities by magnetic means." 25509. 2nd October, 1945. (604689.)

MacFarlane Engineering Co., Ltd., J. C. MacFarlane and W. I. MacFarlane.—"Synchronous alternators." 26796. 12th October, 1945. (Cognate application 35135/45.) (604774.)

A. F. Fekete.—"Dynamo-electric machines." 29931. 9th November, 1945. (604694.)

D. Wallis, A. H. Heir, H. Aldridge and R. E. Mason.—"Insulated wire stripping apparatus." 30283. 13th November, 1945. (604529.)

Automatic Telephone & Electric Co., Ltd., and E. Frydman.—"Resistance elements having positive temperature/resistance characteristics." 30726. 16th November, 1945. (604695.)

Naamlooze Vennootschap Fabriek van Electrische Apparaten Voorheen F. Hazemeijer & Co.—"Enclosed electric switchgear." 30741. 18th August, 1943. (604530.)

Telegraph Condenser Co., Ltd., P. A. Sporing and J. W. Purse.—"Testing of electrical components in bulk." 31818. 26th November, 1945. (604531.)

South Wales Switchgear, Ltd., and S. Farrer.—"Electro-magnetic operating mechanism." 31845. 26th November, 1945. (604533.)

E.C.D., Ltd., and J. P. Mercer.—"Electrolytic cells." 31850. 26th November, 1945. (604536.)

F. R. Cockman.—"Safety devices for electrical heating apparatus." 31869. 26th November, 1945. (604539.)

G. A. Harvey & Co. (London), Ltd., and F. F. Coombs.—"Electrical heating apparatus." 31871. 26th November, 1945. (604540.)

A. Saville and A. W. Collier.—"Connectors for electric cables." 31906. 26th November, 1945. (604546.)

R. A. Adamson.—"Electrically heated soldering irons." 31989. 27th November, 1945. (604555.)

General Electric Co., Ltd., N. C. Smart and R. W. G. Field.—"Telemetering systems." 32016. 27th November, 1945. (604561.)

L. Lewin and C. S. Wright.—"Apparatus for the radiation or reception of electromagnetic waves." 32147. 28th November, 1945. (604612.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—"Magneto-electric systems." 32153. 10th August, 1940. (604613.)

Carr Fastener Co., Ltd., and J. Bennett.—"Holders for thermionic valves, plugs and like electrical devices." 32156. 28th November, 1945. (604614.)

British Thomson-Houston Co., Ltd.—"Lamp filament supports." 32175. 30th November, 1944. (604617.) "Dynamo-electric machines." 32909. 6th December, 1944. (604837.) "Refrigerator control apparatus." 33032. 8th December, 1944. (604856.) "Electric discharge devices of the magnetron type." 33083. 11th December, 1944. (604867.)

Elexcel, Ltd., and E. Barrie.—"Electric smoothing irons." 32226. 29th November, 1945. (604625.)

Metropolitan-Vickers Electrical Co., Ltd., and J. Fowler.—"Regulator switching arrangements for polyphase electrical systems." 32268. 29th November, 1945. (604632.)

Telefonaktiebolaget L. M. Ericsson.—"Electric contact plugs." 32292. 30th November, 1944. (604636.)

Maschinenfabrik Oerlikon.—"Device for the axial adjustment of rotors in asynchronous motors." 32314. 10th September, 1945. (604642.)

O. E. Reich.—"Supports for electric lamp shades." 32358. 31st December, 1945. (604705.)

Sperry Gyroscope Co., Inc.—"Electrical selector switch devices." 32386. 30th November, 1944. (604710.)

General Electric Co., Ltd., and B. Shaw.—"Electric ovens" and "Electric cookers." 32399/400. 30th November, 1945. (604711/2.)

T. Winter, Ltd., and A. R. McDougall.—"Electric lamp fittings." 32432. 30th November, 1945. (604715.)

Chloride Electrical Storage Co., Ltd. (H. P. Murphy).—"Containers for electric storage batteries or accumulators." 32437. 30th November, 1945. (604716.)

M. Slaffer.—"Electrical signalling systems." 32924. 1st December, 1945. (Cognate application 448/46.) (604720.)

Philips Lamps, Ltd.—"Blocking-layer cells." 32633. 2nd August, 1940. (604784.) "Exhaust tube constructions in the envelopes of electric discharge tubes." 10th August, 1940. (604785.)

Metropolitan-Vickers Electrical Co., Ltd., G. H. Fletcher and J. K. Brown.—"Electric generating equipment." 32700. 4th December, 1945. (604796.)

Soc. Anon. de Telecommunications.—"Modulating device, in particular for carrier current telephonic installations." 32759. 6th August, 1942. (604803.)

Pirelli-General Cable Works Ltd., and J. L. Bishop.—"Flexible electric cables." 32860. 5th December, 1945. (604827.)

American Hard Rubber Co.—"Storage battery electrode pencil and method of making same." 32870. 5th June, 1945. (604829.)

Gent & Co., Ltd., and E. O. Chapman.—"Intermittently operating magneto-electric motors." 32936. 5th December, 1945. (604840.)

J. Wooler.—"Electrical plug-type terminal couplings" 32943. 5th December, 1945. (604841.)

H. G. Lubszynski.—"Electron-discharge devices employing mosaic screens." 32974. 6th December, 1945. (604847.)

General Motors Corporation.—"Voltage regulator system." 33094. 9th December, 1944. (604869.)

J. B. Tucker.—"Electric switches and contacts therefor." 33096. 7th December, 1945. (Cognate application 31808/46.) (604870.)

English Electric Co., Ltd., G. H. Allwood and R. D. Ball.—"Electro-magnetic clutches." 33135. 7th December, 1945. (604873.)

General Electric Co., Ltd., and W. Manchester.—"Electric coupling elements." 33160. 7th December, 1945. (604880.)

South Wales Switchgear, Ltd., and P. R. Davies.—"Thermal cut-outs for performing electric switching operations." 33196. 7th December, 1945. (604886.)

Siemens Bros. & Co., Ltd., and M. Reed.—"Repeaters in electrical communication systems." 33199. 7th December, 1945. (604887.)

Midland Electric Manufacturing Co., Ltd., and A. W. Vicary.—"Electric tumbler switches." 33293. 10th December, 1945. (604896.)

A. C. Morrison.—"Apparatus for generating electricity." 33307. 10th December, 1945. (604899.)

P. W. N. Leggett and L. J. Mawby.—"Measuring apparatus for electromagnetic waves." 33360. 10th December, 1945. (604814.)

Standard Telephones & Cables, Ltd.—"Coupled circuits." 33463. 28th March, 1945. (604652.) "Method and means for the transmission of low-frequency calls in telecommunication systems." 33145. 26th December, 1944. (604877.)

Westinghouse Electric International Co.—"Electrical instruments." 34678. 27th December, 1944. (604816.)

Leich Electric Co.—"Automatic exchange switches." 34798. 11th June, 1945. (604656.)

Standard Telephones & Cables, Ltd., and M. M. Levy.—"Multi-channel pulse communication systems." 35067. 28th December, 1945. (604817.)

Marconi's Wireless Telegraph Co., Ltd.—"Coil-winding apparatus." 35212. 30th December, 1944. (604735.)

CONTRACT INFORMATION

Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Aireborough.—24th August. Urban District Council. Two rectifier sets. (23rd July.)

Argentina. — BUENOS AIRES. — 5th August. Administration of the National Sanitary Works Department. Two centrifugal electrically operated pumps with vertical axle for deep wells, together with piping, etc., one central switchboard, l.v., and three other l.v. control switchboards, and three three-phase transformers. (Ref. E.P.D. 38728.)*

Australia. — QUEENSLAND. — 10th September. Brisbane City Council. Nine 33-kV, 500-A air-break switches. (Ref. 37926/48.)*

Canada.—TORONTO.—3rd August. Hydro-Electric Power Commission of Ontario. Two steam generating units, etc., for two 60,000-kW sets at Windsor generating station. (Ref. 30188/48.)*

Castle Ward (Ponteland).—14th August. R.D.C. Electrical installations in 50 houses at Hazlerigg. Surveyor, 7, North Road, Ponteland.

Folkestone.—14th August. Town Council. Improved lighting of the Council Chamber, Town Hall, and four water heaters for the Council Offices, West Terrace. Borough engineer.

Manchester.—27th August. Education Committee. Electrical installation at Crossacres Primary School. (23rd July.)

North Riding.—7th August. County Council. Electric refrigerators (a.c.). (23rd July.)

North Western Area.—4th August. Electricity Board, No. 1 Sub-Area. Electrical installation at the Royal Technical College (Practical) Building Department), Salford. (23rd July.)

South Africa.—DURBAN.—1st October. Electricity Department. Supply of 100, 200, 300 and 500-kVA transformers. (Ref. E.P.D. 38084/48.)*

Stowmarket.—18th August. U.D.C. Electrically driven sewage pumping plants, complete with motors and switchgear. Herbert Bateman & Partners, Chesterfield House, Batheaston, Bath.

Stockton-on-Tees.—Corporation. Electrical installations in 20 houses, Newham Grange estate. A. G. Sinclair, 124, High Street.

Uruguay.—MONTEVIDEO.—9th August. Direccion General de Comunicaciones. Radio telephone transmitters and receivers. (Ref. E.P.D. 37540/48.)*

23rd August. Usinas Electricas y Telefonos del Estado. Five manual telephone exchanges, "universal" type with local battery, 41 switchboards, 900 subscribers' exchanges, and 200 operators' headphones. (Ref. 38183/48.)*

10th August. Usinas Electricas y Telefonos del Estado. Sixty-two power transformers. (Date extended from 8th May.) (Ref. 3,5007/48.)*

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alloa.—Improvements at Town Hall (new lighting); borough surveyor.

Ashbourne.—Houses (50) for U.D.C.; Houfton & Kington, architects, Chesterfield.

Blyth (Northumberland).—Houses (100) at Bebside for the T.C.; direct labour.

Bristol.—Junior school, Novers Lane, for E.C.; city architect, Eagle House.

Caterham.—Block of 16 flats, Croydon Road; G. Stanley Lewis, architect, 84, Norfolk Avenue, Sanderstead.

Chesterfield.—Extensions to works; Bryan Donkin Co., Ltd., Derby Road.

Clackmannan.—New school at Tullibody (£72,000); architect, County Council, Alloa.

Coventry.—Additions to Coventry and Warwickshire Hospital; W. S. Hattrell & Partners, architects, 1, Queen's Road.

Crosby.—Permanent houses (38), de Villiers Avenue; J. R. Fothergill, borough engineer, Town Hall, Waterloo, Liverpool, 22.

East Barnet.—Infants' school, Brookside South (£59,000); Herts. county architect.

Felling-on-Tyne.—Houses (50) for U.D.C.; G. Wimpey & Co., Teams Street, Dunston-on-Tyne.

Fifeshire.—Rehabilitation of Town Hall, Leslie (heating and electrical work); A. D. Haxton & Watson, architects, 5, Scoonie Place, Leven, Fife.

Heanor.—Houses (50), Loscoe Estate; R. Archer, U.D.C. surveyor, Council Offices.

Hyde.—Additions to works, Talbot Road; Imperial Chemical Industries, Ltd. (Leathercloth Division).

Ilford.—Factory, 272-282, Ley Street; G. F. Siegerts, architect, 1, Electric Parade, Seven Kings.

Ilkeston.—Physio-therapy department at the Hospital; W. Church, architect, 17, Kirkby Avenue.

Jarrow.—Works additions, Western Road, for Jarrow Metal Industries, Ltd.

Kidderminster.—Infants' and junior primary schools at Broadwaters; county architect, 38, Foregate Street, Worcester.

Kingston-on-Thames.—Houses (50), Barnfield Avenue; town clerk.

Housing estate, Tudor Drive; G. T. Crouch, Ltd., builders, 3-5, Thames Street.

Lincoln. — Extensions, Lincoln Training College; Watkins & Coombes, architects, High Street.

Liverpool.—Bakery, Kirby Trading Estate; W. J. Brookes & Sons, Ltd., Skerton Road, Old Trafford, Manchester.

London.—WANDSWORTH.—Three blocks of flats, Crockerton Road, Clapham Common South, and Oxford Road; R. H. Jerman, town clerk, Municipal Buildings, S.W.18.

HOXTON.—Dwellings (92) in four blocks, Colville Estate, for Shoreditch B.C.; C. T. Fulcher, borough architect and surveyor, Town Hall, Old Street, E.C.1.

Manchester.—Additions to Brass Works, Lord Street, Miles Platting, E. Jackson & Co.; Cruickshank & Seward, architects, 16, Princess Street.

Mexborough.—Houses (34), Highwoods Estate; S. H. E. Crane, clerk to U.D.C., Montagu Buildings.

Newcastle-on-Tyne.—Extensions, Throat, Nose and Ear Hospital, Rye Hill; Marshall & Tweedy, Grainger House.

Northampton.—Catholic church at Duston for R. C. Diocesan Board of Finance; Rev. W. Hunting, secretary, Bishop's House.

Nottingham.—Works extensions, Lenton, for Raleigh Industries, Ltd.; T. Bow, builder, 49, Lamartine Street.

Overton.—Junior and infants' school for Salop E.C.; A. Guy Chant, county architect, 5, Belmont, Shrewsbury.

Portsmouth.—Technical College annexe; city engineer, City Council Chambers, Clarence Parade, Southsea.

Reading.—Two blocks of flats, Westcote Road; A. P. Watts, builder, Connaught Avenue, Ashford, Middlesex.

Technical college for E.C.; Lanchester & Lodge, architects, 10, Woburn Square, W.C.1.

Rochdale.—Central public abattoir, Cattle Market ; borough surveyor, Town Hall.

St. Albans.—Houses (50); R.D.C. surveyor, 43, Upper Latimore Road.

Scarborough.—Additions to the Castle Works of Plaxton (Scarborough), Ltd.; Alderson & Allen, architects, St. Nicholas Street.

Smethwick.—Workshops, Chance Technical College; Roland Fletcher, borough engineer.

Southport.—Two schools, Birkdale; borough architect, Town Hall.

Stockton-on-Tees.—Primary school, Darlington Lane, for E.C.; borough architect, 124, High Street.

Sunderland.—Lecture room and laboratory at Technical College ; C. A. Murray, education architect, Ryhope Road.

Treforest.—Workshops at the School of Mines and Technology; L. R. Gower, county architect, County Hall, Cardiff.

Upton-on-Severn.—County school, Tunnel Hill; county architect, Foregate Street, Worcester.

Wakefield.—Primary schools, Flanshaw Estate, Lupset, and Eastmoor, for T.C.; borough education architect.

Walsall.—Factory, Long Acre Street; Job Wheway & Sons, Ltd., Green Lane.